

SECTION **EC**

ENGINE CONTROL SYSTEM

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SERVICE INFORMATION

APPLICATION NOTICE

How to Check Vehicle Type

INFOID:0000000005448167

Check the vehicle type (refer to [GI-47](#)) to confirm the service information in EC section.

Service information	Remarks
VQ TYPE 1	Models for Australia
VQ TYPE 2	Models except for Australia

A

EC

C

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E

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[VQ TYPE 1]

INDEX FOR DTC

U1000 - U1001

INFOID:000000005448168

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	EC-149
U1001	1001*4	CAN COMM CIRCUIT	EC-149

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT.

P0011 - P0118

INFOID:000000005448169

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P0011	0011	INT/V TIM CONT-B1	EC-151
P0021	0021	INT/V TIM CONT-B2	EC-151
P0037	0037	HO2S2 HTR (B1)	EC-155
P0038	0038	HO2S2 HTR (B1)	EC-155
P0057	0057	HO2S2 HTR (B2)	EC-155
P0058	0058	HO2S2 HTR (B2)	EC-155
P0102	0102	MAF SEN/CIRCUIT	EC-163
P0103	0103	MAF SEN/CIRCUIT	EC-163
P0112	0112	IAT SEN/CIRCUIT	EC-170
P0113	0113	IAT SEN/CIRCUIT	EC-170
P0117	0117	ECT SEN/CIRC	EC-174
P0118	0118	ECT SEN/CIRC	EC-174

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0122 - P0223

INFOID:000000005448170

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

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[VQ TYPE 1]

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P0122	0122	TP SEN 2/CIRC	EC-179
P0123	0123	TP SEN 2/CIRC	EC-179
P0138	0138	HO2S2 (B1)	EC-185
P0139	0139	HO2S2 (B1)	EC-194
P0158	0158	HO2S2 (B2)	EC-185
P0159	0159	HO2S2 (B2)	EC-194
P0171	0171	FUEL SYS-LEAN-B1	EC-204
P0172	0172	FUEL SYS-RICH-B1	EC-214
P0174	0174	FUEL SYS-LEAN-B2	EC-204
P0175	0175	FUEL SYS-RICH-B2	EC-214
P0222	0222	TP SEN 1/CIRC	EC-224
P0223	0223	TP SEN 1/CIRC	EC-224

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0300 - P0345

INFOID:000000005448171

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P0300	0300	MULTI CYL MISFIRE	EC-230
P0301	0301	CYL 1 MISFIRE	EC-230
P0302	0302	CYL 2 MISFIRE	EC-230
P0303	0303	CYL 3 MISFIRE	EC-230
P0304	0304	CYL 4 MISFIRE	EC-230
P0305	0305	CYL 5 MISFIRE	EC-230
P0306	0306	CYL 6 MISFIRE	EC-230
P0327	0327	KNOCK SEN/CIRC-B1	EC-237
P0328	0328	KNOCK SEN/CIRC-B1	EC-237
P0332	0332	KNOCK SEN/CIRC-B2	EC-237
P0333	0333	KNOCK SEN/CIRC-B2	EC-237
P0335	0335	CKP SEN/CIRCUIT	EC-242
P0340	0340	CMP SEN/CIRC-B1	EC-248
P0345	0345	CMP SEN/CIRC-B2	EC-248

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0420 - P0605

INFOID:000000005448172

NOTE:

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[VQ TYPE 1]

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P0420	0420	TW CATALYST SYS-B1	EC-257
P0430	0430	TW CATALYST SYS-B2	EC-257
P0444	0444	PURG VOLUME CONT/V	EC-261
P0445	0445	PURG VOLUME CONT/V	EC-261
P0500	0500	VEH SPEED SEN/CIRC	EC-267
P0550	0550	PW ST P SEN/CIRC	EC-269
P0605	0605	ECM	EC-274

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0700 - P0745

INFOID:000000006134234

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P0700	0700	TRANSMISSION CONT	AT-116
P0705	0705	T/M RANGE SENSOR A	AT-117
P0720	0720	OUTPUT SPEED SENSOR	AT-123
P0731	0731	1GR INCORRECT RATIO	AT-130
P0732	0732	2GR INCORRECT RATIO	AT-133
P0733	0733	3GR INCORRECT RATIO	AT-136
P0734	0734	4GR INCORRECT RATIO	AT-139
P0735	0735	5GR INCORRECT RATIO	AT-142
P0740	0740	TORQUE CONVERTER	AT-145
P0744	0744	TORQUE CONVERTER	AT-147
P0745	0745	PC SOLENOID A	AT-149

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1031 - P1128

INFOID:000000005448173

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

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[VQ TYPE 1]

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P1031	1031	A/F SEN1 HTR (B1)	EC-276
P1032	1032	A/F SEN1 HTR (B1)	EC-276
P1051	1051	A/F SEN1 HTR (B2)	EC-276
P1052	1052	A/F SEN1 HTR (B2)	EC-276
P1065	1065	ECM BACK UP/CIRCUIT	EC-283
P1111	1111	INT/V TIM V/CIR-B1	EC-287
P1121	1121	ETC ACTR	EC-294
P1122	1122	ETC FUNCTION/CIRC	EC-296
P1124	1124	ETC MOT PWR	EC-302
P1126	1126	ETC MOT PWR	EC-302
P1128	1128	ETC MOT	EC-307
P1136	1136	INT/V TIM V/CIR-B2	EC-287

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1136 - P1229

INFOID:000000005448174

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P1136	1136	INT/V TIM V/CIR-B2	EC-287
P1146	1146	HO2S2 (B1)	EC-311
P1147	1147	HO2S2 (B1)	EC-321
P1166	1166	HO2S2 (B2)	EC-311
P1167	1167	HO2S2 (B2)	EC-321
P1217	1217	ENG OVER TEMP	EC-331
P1225	1225	CTP LEARNING	EC-340
P1226	1226	CTP LEARNING	EC-342
P1229	1229	SENSOR POWER/CIRC	EC-344

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1271 - P1289

INFOID:000000005448175

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

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[VQ TYPE 1]

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P1271	1271	A/F SENSOR1 (B1)	EC-351
P1272	1272	A/F SENSOR1 (B1)	EC-359
P1273	1273	A/F SENSOR1 (B1)	EC-367
P1274	1274	A/F SENSOR1 (B1)	EC-376
P1276	1276	A/F SENSOR1 (B1)	EC-385
P1278	1278	A/F SENSOR1 (B1)	EC-393
P1279	1279	A/F SENSOR1 (B1)	EC-402
P1281	1281	A/F SENSOR1 (B2)	EC-351
P1282	1282	A/F SENSOR1 (B2)	EC-359
P1283	1283	A/F SENSOR1 (B2)	EC-367
P1284	1284	A/F SENSOR1 (B2)	EC-376
P1286	1286	A/F SENSOR1 (B2)	EC-385
P1288	1288	A/F SENSOR1 (B2)	EC-393
P1289	1289	A/F SENSOR1 (B2)	EC-402

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1564 - P1805

INFOID:000000005448176

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P1564	1564	ASCD SW	EC-411
P1572	1572	ASCD BRAKE SW	EC-417
P1574	1574	ASCD VHL SPD SEN	EC-428
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-51
P1706	1706	P-N POS SW/CIRCUIT	EC-430
P1715	1715	IN PLUY SPEED	EC-436
P1716	1716	INPUT SPEED SENSOR A	AT-121
P1730	1730	INTERLOCK	AT-159
P1752	1752	INPUT CLUTCH SOL	AT-163
P1757	1757	FR BRAKE SOLENOID	AT-165
P1762	1762	DRCT CLUTCH SOL	AT-167
P1767	1767	HLR CLUTCH SOLENOID	AT-169
P1774	1774	L C BRAKE SOLENOID	AT-173
P1805	1805	BRAKE SW/CIRCUIT	EC-437

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

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[VQ TYPE 1]

P2122 - P2138

INFOID:000000005448177

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*3		
P2122	2122	APP SEN 1/CIRC	EC-442
P2123	2123	APP SEN 1/CIRC	EC-442
P2127	2127	APP SEN 2/CIRC	EC-448
P2128	2128	APP SEN 2/CIRC	EC-448
P2135	2135	TP SENSOR	EC-455
P2138	2138	APP SENSOR	EC-461

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006135612

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

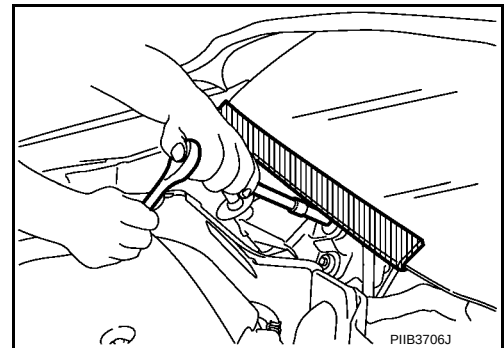
WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000006135613

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



On Board Diagnosis (OBD) System of Engine

INFOID:000000005448180

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-82](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.

PRECAUTIONS

< SERVICE INFORMATION >

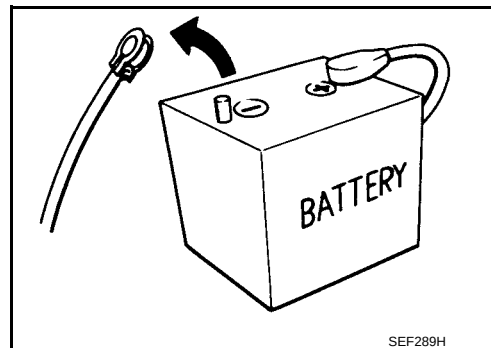
[VQ TYPE 1]

- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

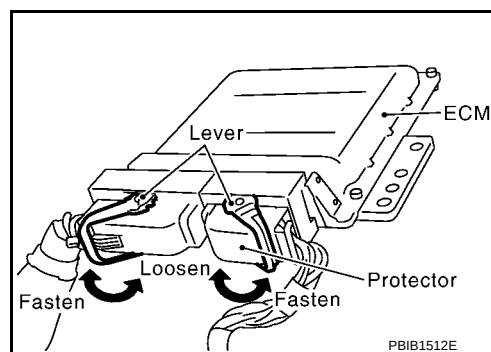
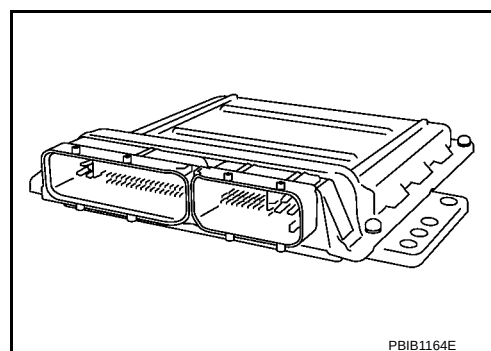
Precaution

INFOID:000000005448181

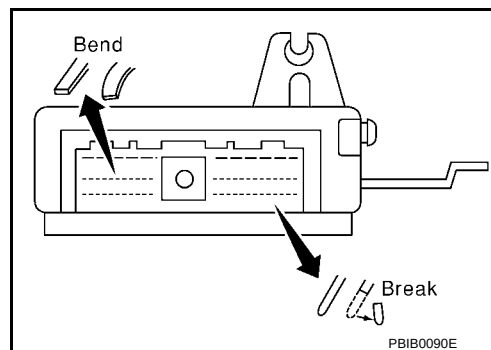
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values
- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.



- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.

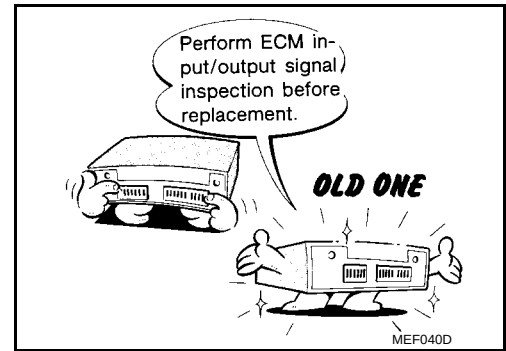


PRECAUTIONS

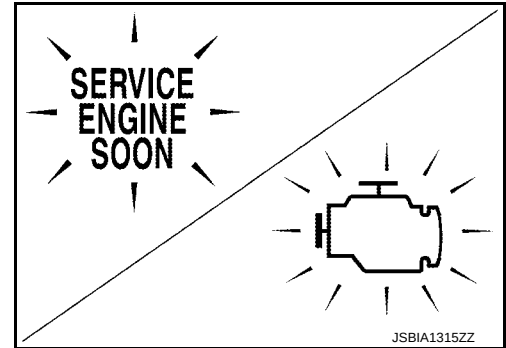
< SERVICE INFORMATION >

[VQ TYPE 1]

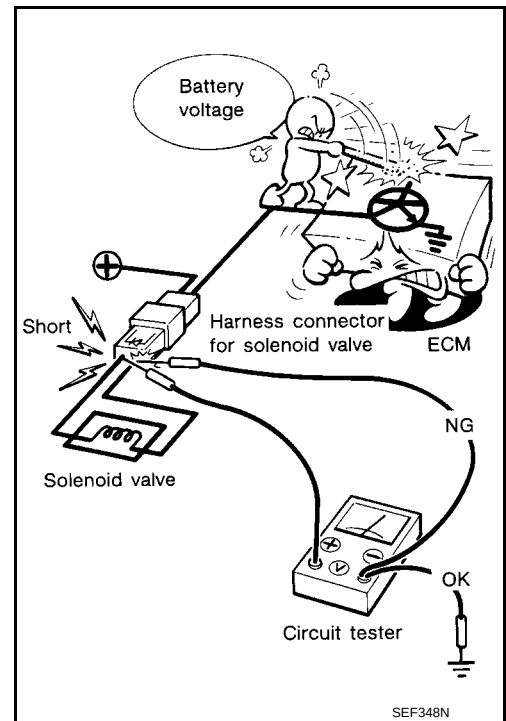
- Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to **EC-108, "ECM Terminal and Reference Value"**.
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

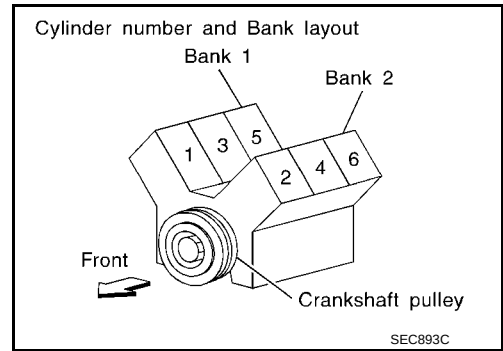


PRECAUTIONS

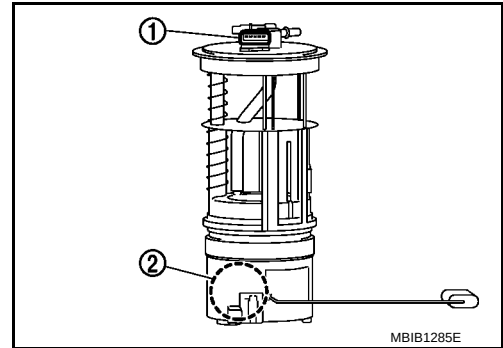
< SERVICE INFORMATION >

[VQ TYPE 1]

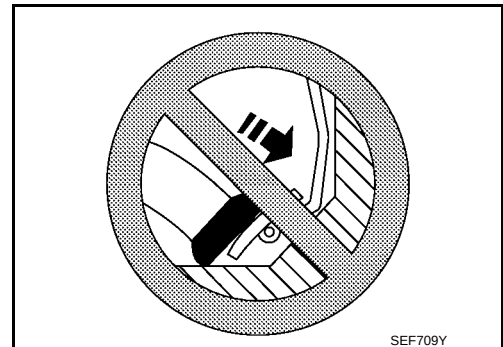
- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.



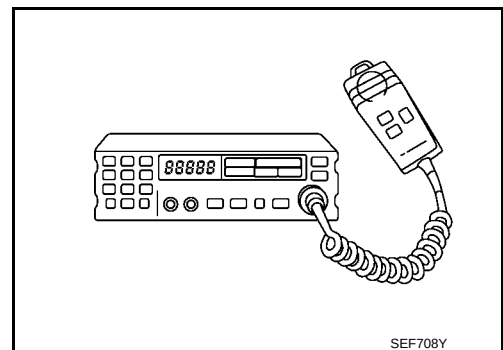
- Do not operate fuel pump when there is no fuel in lines.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Tighten fuel hose clamps to the specified torque.



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

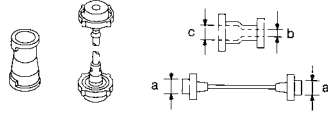
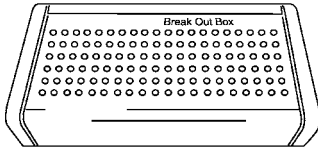
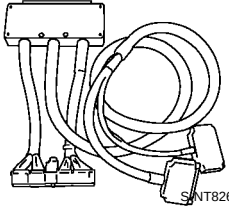
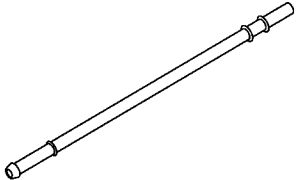
< SERVICE INFORMATION >

[VQ TYPE 1]

PREPARATION

Special Service Tool

INFOID:000000005448182

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester
KV101118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

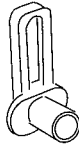
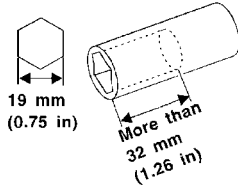
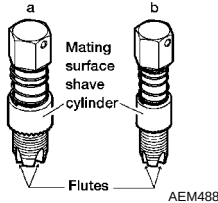
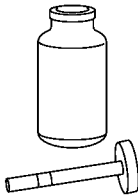
PREPARATION

< SERVICE INFORMATION >

[VQ TYPE 1]

Commercial Service Tool

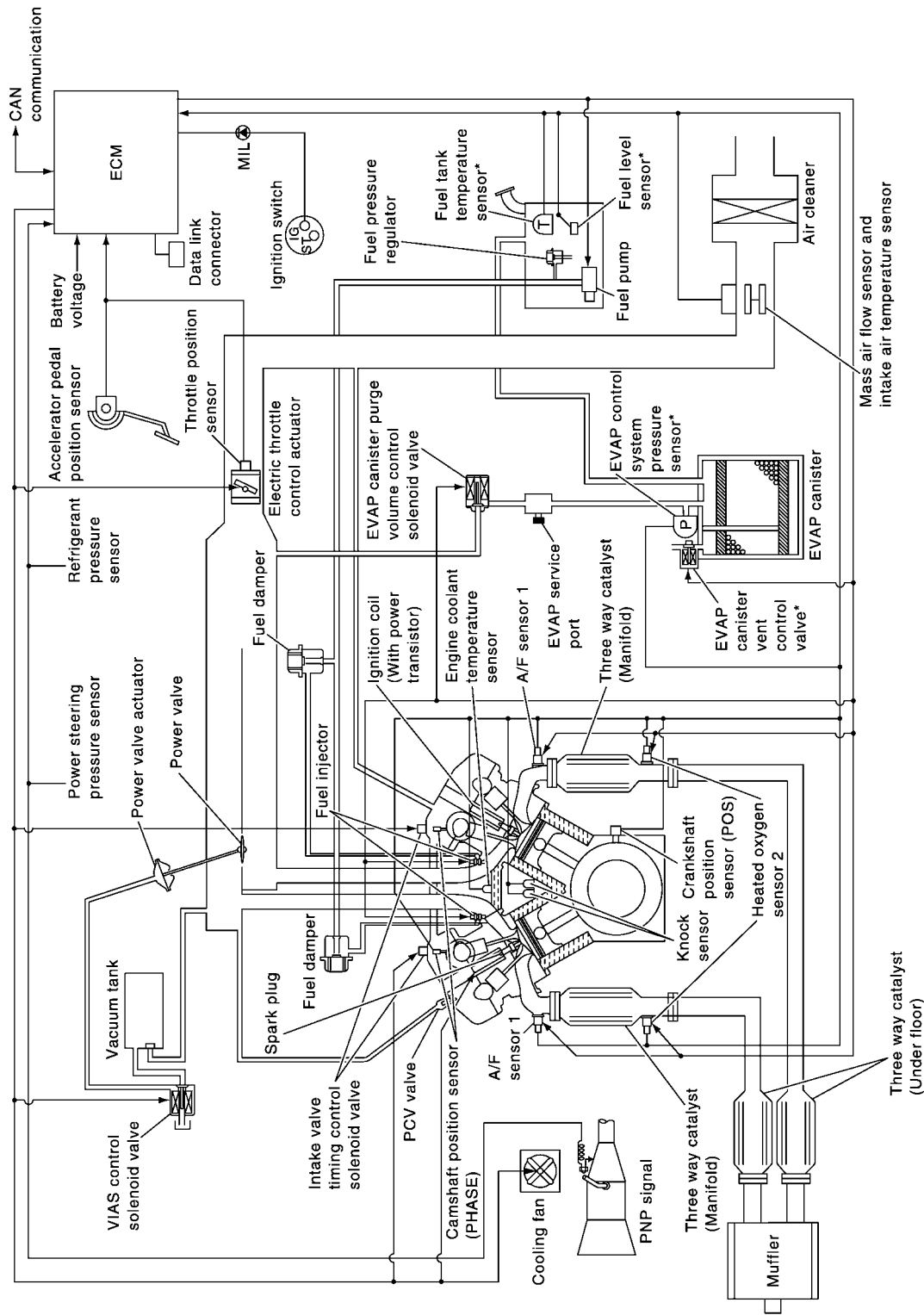
INFOID:000000005448183

Tool name	Description
Quick connector re-release  PBIC0198E	Remove fuel tube quick connectors in engine room
Fuel filler cap adapter  S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

Schematic

INFOID:000000005448184



*: This sensor/actuator is not for controlling the engine system, nor for the on board diagnosis.

JPBIA3537GB

Multiport Fuel Injection (MFI) System

INFOID:000000005448185

INPUT/OUTPUT SIGNAL CHART

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ³	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
TCM	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage* ³		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2* ¹	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation* ²		
Wheel sensor	Vehicle speed* ²		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

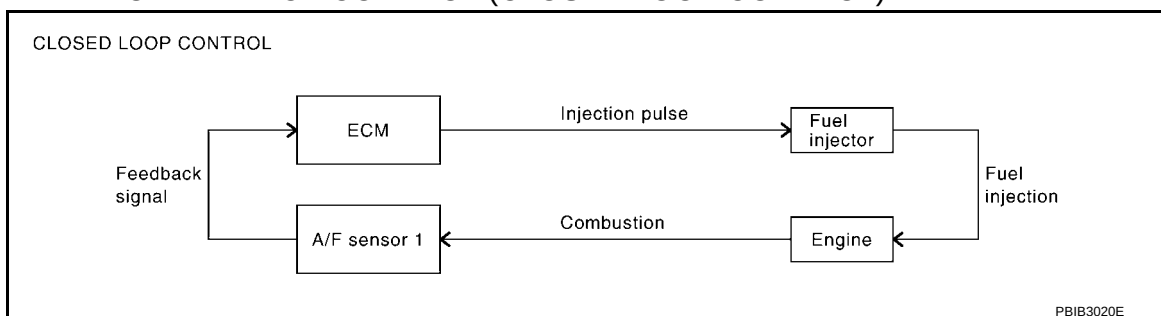
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air

< SERVICE INFORMATION >

fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to [EC-351](#). This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

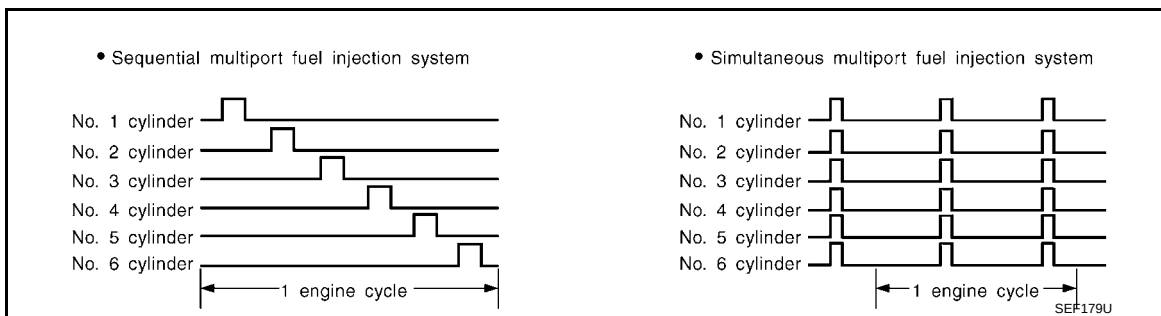
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six fuel injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

INFOID:000000005448186

EC

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
TCM	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1-2-3-4-5-6

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:000000005448187

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
TCM	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under [EC-36. "Multiport Fuel Injection \(MFI\) System"](#).

AIR CONDITIONING CUT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 1]

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:000000005448188

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

System Description

INFOID:000000005448189

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

[VQ TYPE 1]

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:000000005448190

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD steering switch	ASCD steering switch operation		
TCM	Gear position Powertrain revolution*		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by depressing SET/COAST switch or RESUME/ACCELERATE switch.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

[VQ TYPE 1]

When the RESUME/ACCELERATE switch is pressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 175 km/h (109 MPH)

Component Description

INFOID:000000005448191

ASCD STEERING SWITCH

Refer to [EC-411](#).

ASCD BRAKE SWITCH

Refer to [EC-417](#) and [EC-468](#).

STOP LAMP SWITCH

Refer to [EC-417](#), [EC-437](#) and [EC-468](#).

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EC-294](#), [EC-296](#), [EC-302](#) and [EC-307](#).

ASCD INDICATOR

Refer to [EC-478](#).

A

EC

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CAN COMMUNICATION

System Description

INFOID:000000005448192

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-49, "CAN Communication Signal Chart"](#), about CAN communication for detail.

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

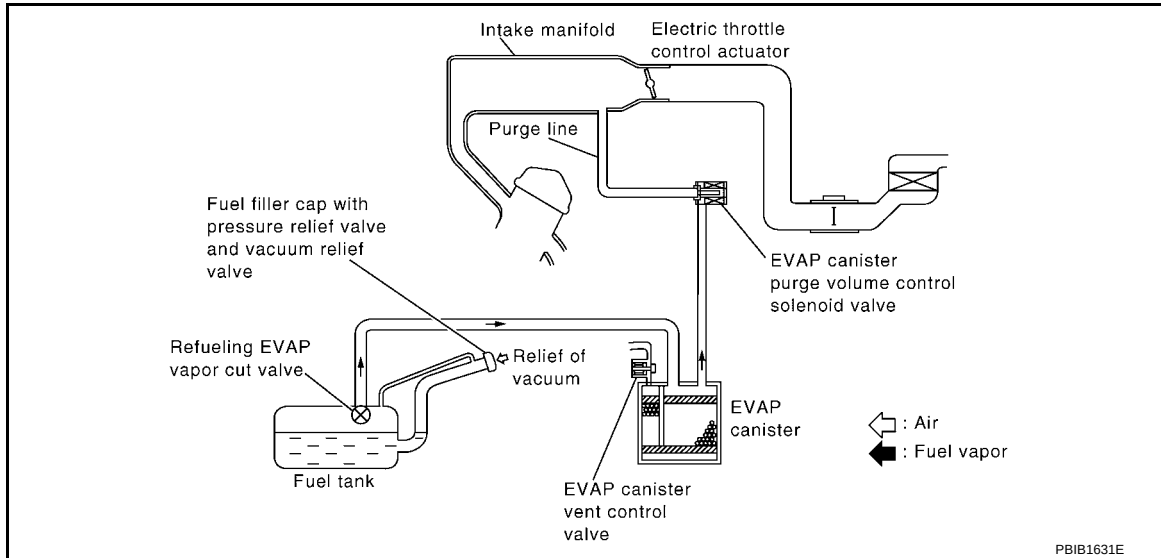
[VQ TYPE 1]

EVAPORATIVE EMISSION SYSTEM

Description

INFOID:000000005448193

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

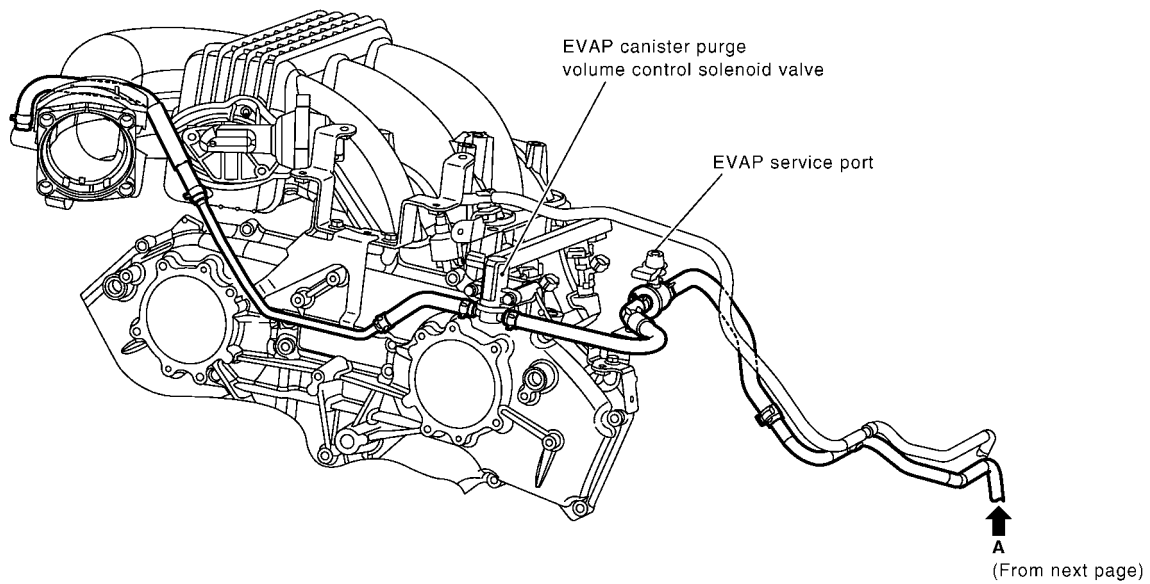
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

EVAPORATIVE EMISSION LINE DRAWING



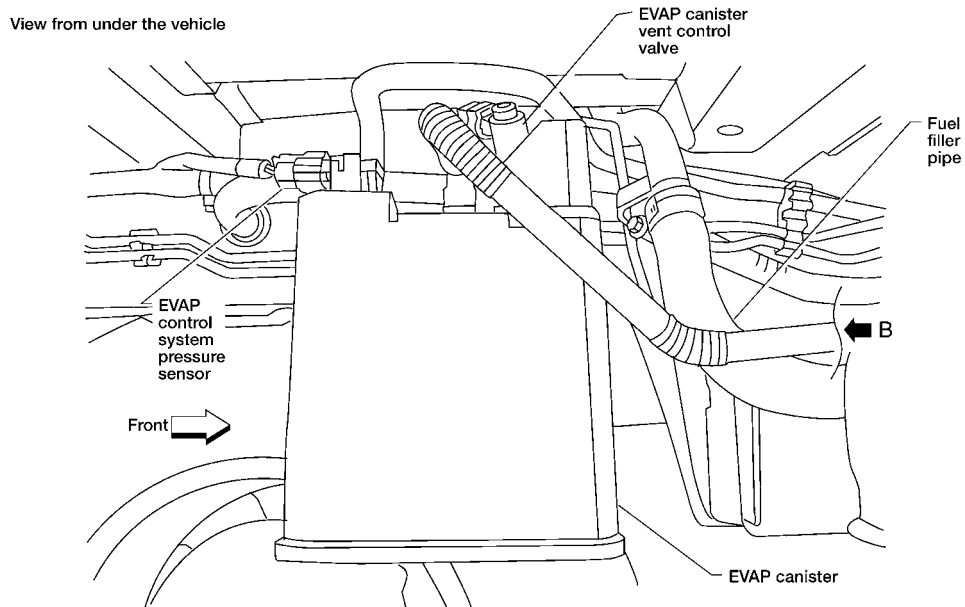
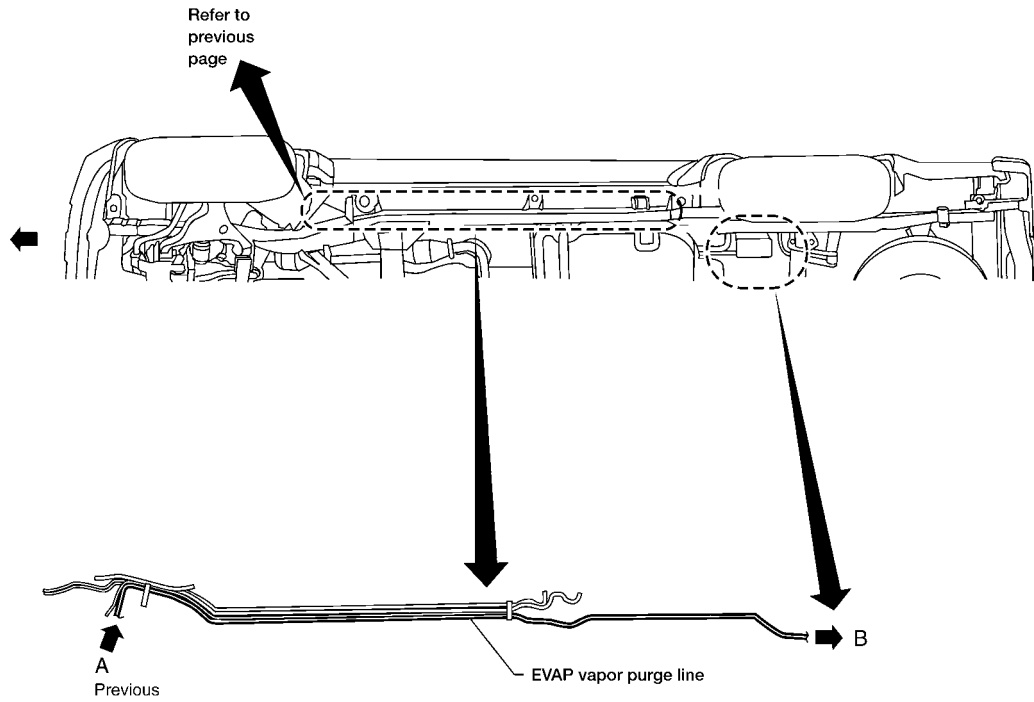
NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB2774E

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]



BBIA0594E

INFOID:0000000005448194

Component Inspection

EVAP CANISTER

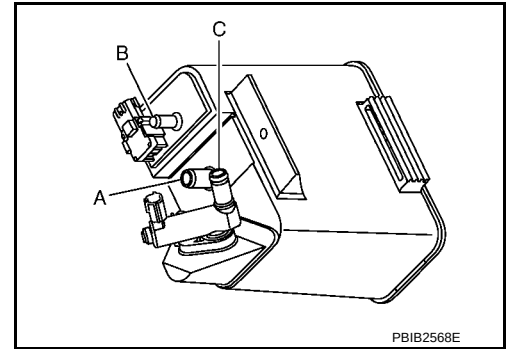
EVAPORATIVE EMISSION SYSTEM

[VQ TYPE 1]

< SERVICE INFORMATION >

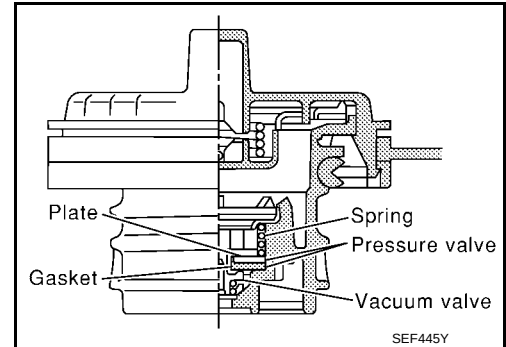
Check EVAP canister as follows:

1. Block port **B**.
2. Blow air into port **A** and check that it flows freely out of port **C**.
3. Release blocked port **B**.
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C**.
5. Block port **A** and **B**.
6. Apply pressure to port **C** and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

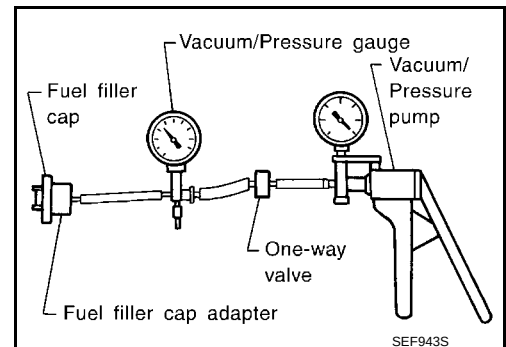
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)
Vacuum: -6.0 to -3.3 kPa (-0.060 to -0.033 bar, -0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-266, "Component Inspection"](#).

EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-486, "Component Inspection"](#).

POSITIVE CRANKCASE VENTILATION

< SERVICE INFORMATION >

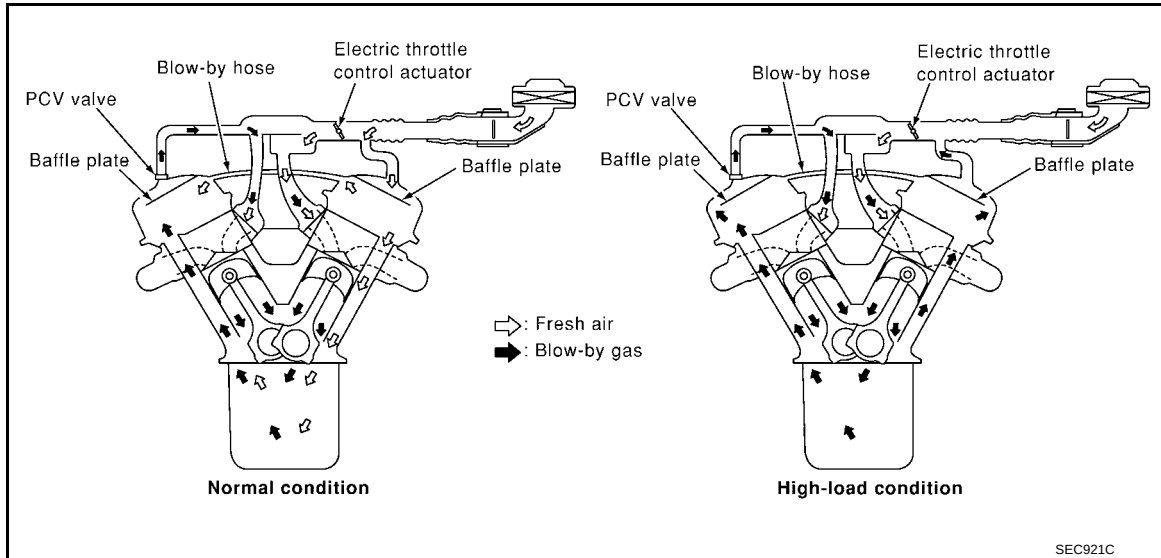
[VQ TYPE 1]

POSITIVE CRANKCASE VENTILATION

Description

INFOID:000000005448195

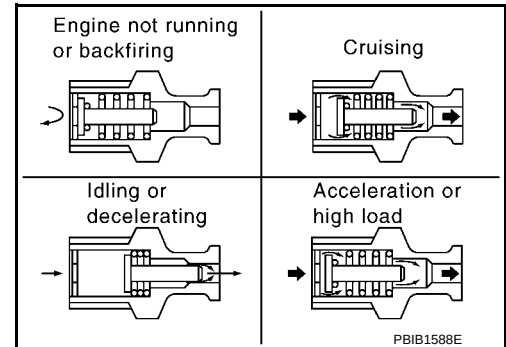
SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

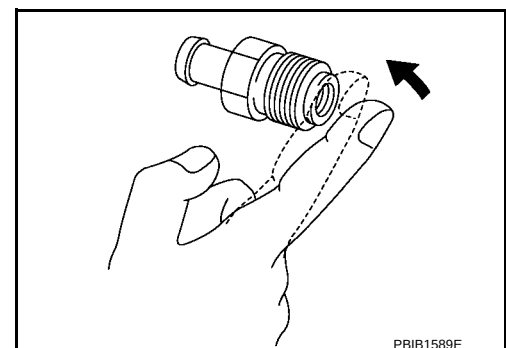


Component Inspection

INFOID:000000005448196

PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



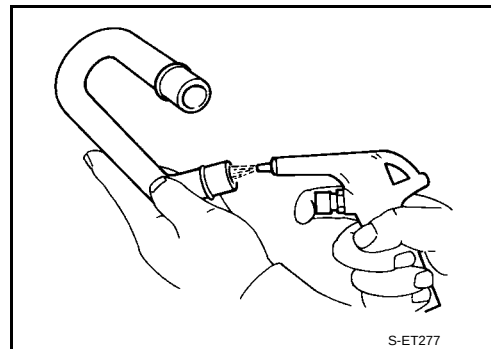
POSITIVE CRANKCASE VENTILATION

[VQ TYPE 1]

< SERVICE INFORMATION >

PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



NATS (NISSAN ANTI-THEFT SYSTEM)

Description

INFOID:000000005448197

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT using NATS program card. Refer to [BL-70](#).
- Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT.
- When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT using NATS program card.
Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT Operation Manual, NATS.

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:000000005448198

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Service \$03 of ISO 15031-5
Freeze Frame data	Service \$02 of ISO 15031-5
System Readiness Test (SRT) code	Service \$01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service \$06 of ISO 15031-5
Calibration ID	Service \$09 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT	×	×	×	×	×	—
GST	×	×	×	—	×	×
ECM	×	×*	—	—	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to [EC-92](#).)

Two Trip Detection Logic

INFOID:000000005448199

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-53 .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

INFOID:000000005448200

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page
	CONSULT GST*2	ECM*3					
CAN COMM CIRCUIT	U1000	1000*4	—	—	1 or 2	× or —	EC-149
CAN COMM CIRCUIT	U1001	1001*4	—	—	2	—	EC-149
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	2	—	EC-151
INT/V TIM CONT-B2	P0021	0021	—	—	2	—	EC-151
HO2S2 HTR (B1)	P0037	0037	×	×	2	×	EC-155
HO2S2 HTR (B1)	P0038	0038	×	×	2	×	EC-155
HO2S2 HTR (B2)	P0057	0057	×	×	2	×	EC-155
HO2S2 HTR (B2)	P0058	0058	×	×	2	×	EC-155
MAF SEN/CIRCUIT	P0102	0102	—	—	1	×	EC-163
MAF SEN/CIRCUIT	P0103	0103	—	—	1	×	EC-163
IAT SEN/CIRCUIT	P0112	0112	—	—	2	×	EC-170
IAT SEN/CIRCUIT	P0113	0113	—	—	2	×	EC-170
ECT SEN/CIRC	P0117	0117	—	—	1	×	EC-174
ECT SEN/CIRC	P0118	0118	—	—	1	×	EC-174
TP SEN 2/CIRC	P0122	0122	—	—	1	×	EC-179
TP SEN 2/CIRC	P0123	0123	—	—	1	×	EC-179
HO2S2 (B1)	P0138	0138	—	×	2	×	EC-185
HO2S2 (B1)	P0139	0139	×	×	2	×	EC-194
HO2S2 (B2)	P0158	0158	—	×	2	×	EC-185
HO2S2 (B2)	P0159	0159	×	×	2	×	EC-194
FUEL SYS-LEAN-B1	P0171	0171	—	—	2	×	EC-204
FUEL SYS-RICH-B1	P0172	0172	—	—	2	×	EC-214
FUEL SYS-LEAN-B2	P0174	0174	—	—	2	×	EC-204
FUEL SYS-RICH-B2	P0175	0175	—	—	2	×	EC-214
TP SEN 1/CIRC	P0222	0222	—	—	1	×	EC-224
TP SEN 1/CIRC	P0223	0223	—	—	1	×	EC-224
MULTI CYL MISFIRE	P0300	0300	—	—	2	×	EC-230
CYL 1 MISFIRE	P0301	0301	—	—	2	×	EC-230
CYL 2 MISFIRE	P0302	0302	—	—	2	×	EC-230
CYL 3 MISFIRE	P0303	0303	—	—	2	×	EC-230
CYL 4 MISFIRE	P0304	0304	—	—	2	×	EC-230
CYL 5 MISFIRE	P0305	0305	—	—	2	×	EC-230
CYL 6 MISFIRE	P0306	0306	—	—	2	×	EC-230
KNOCK SEN/CIRC-B1	P0327	0327	—	—	2	—	EC-237

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Items (CONSULT screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page
	CONSULT GST*2	ECM*3					
KNOCK SEN/CIRC-B1	P0328	0328	—	—	2	—	EC-237
KNOCK SEN/CIRC-B2	P0332	0332	—	—	2	—	EC-237
KNOCK SEN/CIRC-B2	P0333	0333	—	—	2	—	EC-237
CKP SEN/CIRCUIT	P0335	0335	—	—	2	×	EC-242
CMP SEN/CIRC-B1	P0340	0340	—	—	2	×	EC-248
CMP SEN/CIRC-B2	P0345	0345	—	—	2	×	EC-248
TW CATALYST SYS-B1	P0420	0420	×	×	2	×	EC-257
TW CATALYST SYS-B2	P0430	0430	×	×	2	×	EC-257
PURG VOLUME CONT/V	P0444	0444	—	—	2	×	EC-261
PURG VOLUME CONT/V	P0445	0445	—	—	2	×	EC-261
VEHICLE SPEED SENSOR A	P0500	0500	—	—	2	×	EC-267
PW ST P SEN/CIRC	P0550	0550	—	—	2	—	EC-269
ECM	P0605	0605	—	—	1 or 2	×	EC-274
TRANSMISSION CONT	P0700	0700	—	—	1	×	AT-116
T/M RANGE SENSOR A	P0705	0705	—	—	2	×	AT-117
OUTPUT SPEED SENSOR	P0720	0720	—	—	2	×	AT-123
1GR INCORRECT RATIO	P0731	0731	—	—	2	×	AT-130
2GR INCORRECT RATIO	P0732	0732	—	—	2	×	AT-133
3GR INCORRECT RATIO	P0733	0733	—	—	2	×	AT-136
4GR INCORRECT RATIO	P0734	0734	—	—	2	×	AT-139
5GR INCORRECT RATIO	P0735	0735	—	—	2	×	AT-142
TORQUE CONVERTER	P0740	0740	—	—	2	×	AT-145
TORQUE CONVERTER	P0744	0744	—	—	2	×	AT-147
PC SOLENOID A	P0745	0745	—	—	2	×	AT-149
A/F SEN1 HTR (B1)	P1031	1031	×	×	2	×	EC-276
A/F SEN1 HTR (B1)	P1032	1032	×	×	2	×	EC-276
A/F SEN1 HTR (B2)	P1051	1051	×	×	2	×	EC-276
A/F SEN1 HTR (B2)	P1052	1052	×	×	2	×	EC-276
ECM BACK UP/CIRC	P1065	1065	—	—	2	×	EC-283
INT/V TIM V/CIR-B1	P1111	1111	—	—	2	×	EC-287
ETC ACTR	P1121	1121	—	—	1	×	EC-294
ETC FUNCTION/CIRC	P1122	1122	—	—	1	×	EC-296
ETC MOT PWR	P1124	1124	—	—	1	×	EC-302
ETC MOT PWR	P1126	1126	—	—	1	×	EC-302
ETC MOT	P1128	1128	—	—	1	×	EC-307
INT/V TIM V/CIR-B2	P1136	1136	—	—	2	×	EC-287
HO2S2 (B1)	P1146	1146	×	×	2	×	EC-311
HO2S2 (B1)	P1147	1147	×	×	2	×	EC-321
HO2S2 (B2)	P1166	1166	×	×	2	×	EC-311
HO2S2 (B2)	P1167	1167	×	×	2	×	EC-321
ENG OVER TEMP	P1217	1217	—	—	1	×	EC-331
CTP LEARNING	P1225	1225	—	—	2	—	EC-340

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Items (CONSULT screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page	
	CONSULT GST*2	ECM*3						
CTP LEARNING	P1226	1226	—	—	2	—	EC-342	EC
SENSOR POWER/CIRC	P1229	1229	—	—	1	×	EC-344	
A/F SENSOR1 (B1)	P1271	1271	—	×	2	×	EC-351	C
A/F SENSOR1 (B1)	P1272	1272	—	×	2	×	EC-359	
A/F SENSOR1 (B1)	P1273	1273	—	×	2	×	EC-367	D
A/F SENSOR1 (B1)	P1274	1274	—	×	2	×	EC-376	
A/F SENSOR1 (B1)	P1276	1276	—	×	2	×	EC-385	E
A/F SENSOR1 (B1)	P1278	1278	×	×	2	×	EC-393	
A/F SENSOR1 (B1)	P1279	1279	×	×	2	×	EC-402	F
A/F SENSOR1 (B2)	P1281	1281	—	×	2	×	EC-351	
A/F SENSOR1 (B2)	P1282	1282	—	×	2	×	EC-359	G
A/F SENSOR1 (B2)	P1283	1283	—	×	2	×	EC-367	
A/F SENSOR1 (B2)	P1284	1284	—	×	2	×	EC-376	H
A/F SENSOR1 (B2)	P1286	1286	—	×	2	×	EC-385	
A/F SENSOR1 (B2)	P1288	1288	×	×	2	×	EC-393	I
A/F SENSOR1 (B2)	P1289	1289	×	×	2	×	EC-402	
ASCD SW	P1564	1564	—	—	1	—	EC-411	J
ASCD BRAKE SW	P1572	1572	—	—	1	—	EC-417	
ASCD VHL SPD SEN	P1574	1574	—	—	1	—	EC-428	K
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	2	—	EC-51	
P-N POS SW/CIRCUIT	P1706	1706	—	—	2	×	EC-430	L
IN PULY SPEED	P1715	1715	—	—	2	—	EC-436	
INPUT SPEED SENSOR A	P1716	1716	—	—	2	×	AT-121	M
INTERLOCK	P1730	1730	—	—	1	×	AT-159	
INPUT CLUTCH SOL	P1752	1752	—	—	1	×	AT-163	N
FR BRAKE SOLENOID	P1757	1757	—	—	1	×	AT-165	
DRCT CLUTCH SOL	P1762	1762	—	—	1	×	AT-167	O
HLR CLUTCH SOLENOID	P1767	1767	—	—	1	×	AT-169	
L C BRAKE SOLENOID	P1774	1774	—	—	1	×	AT-173	P
BRAKE SW/CIRCUIT	P1805	1805	—	—	2	—	EC-437	
APP SEN 1/CIRC	P2122	2122	—	—	1	×	EC-442	
APP SEN 1/CIRC	P2123	2123	—	—	1	×	EC-442	
APP SEN 2/CIRC	P2127	2127	—	—	1	×	EC-448	
APP SEN 2/CIRC	P2128	2128	—	—	1	×	EC-448	
TP SENSOR	P2135	2135	—	—	1	×	EC-455	
APP SENSOR	P2138	2138	—	—	1	×	EC-461	

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC need CONSULT.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-86, "Trouble Diagnosis Introduction"](#). Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

 **With CONSULT**

 **With GST**

CONSULT or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.

These DTCs are prescribed by ISO 15031-5.

(CONSULT also displays the malfunctioning component or system.)

 **No Tools**

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify malfunction status as shown below. Therefore, using CONSULT (if available) is recommended.**

A sample of CONSULT display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For details, see [EC-117, "CONSULT Function \(ENGINE\)"](#).

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
HO2S	1	Air fuel ratio (A/F) sensor 1	P1278, P1288
		Air fuel ratio (A/F) sensor 1	P1279, P1289
		Heated oxygen sensor 2	P0139, P0159
		Heated oxygen sensor 2	P1146, P1166
		Heated oxygen sensor 2	P1147, P1167
HO2S HTR	1	Air fuel ratio (A/F) sensor 1 heater	P1031, P1032, P1051, P1052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

SRT Set Timing

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example					
		Diagnosis	Ignition cycle				
			← ON →	OFF	← ON →	OFF	← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)	
		P0402	OK (1)	— (1)	— (1)	OK (2)	
		P1402	OK (1)	OK (2)	— (2)	— (2)	
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"	
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)	
		P0402	— (0)	— (0)	OK (1)	— (1)	
		P1402	OK (1)	OK (2)	— (2)	— (2)	
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"	
NG exists	Case 3	P0400	OK	OK	—	—	
		P0402	—	—	—	—	
		P1402	NG	—	NG	NG (Consecutive NG)	
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)	
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"	

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

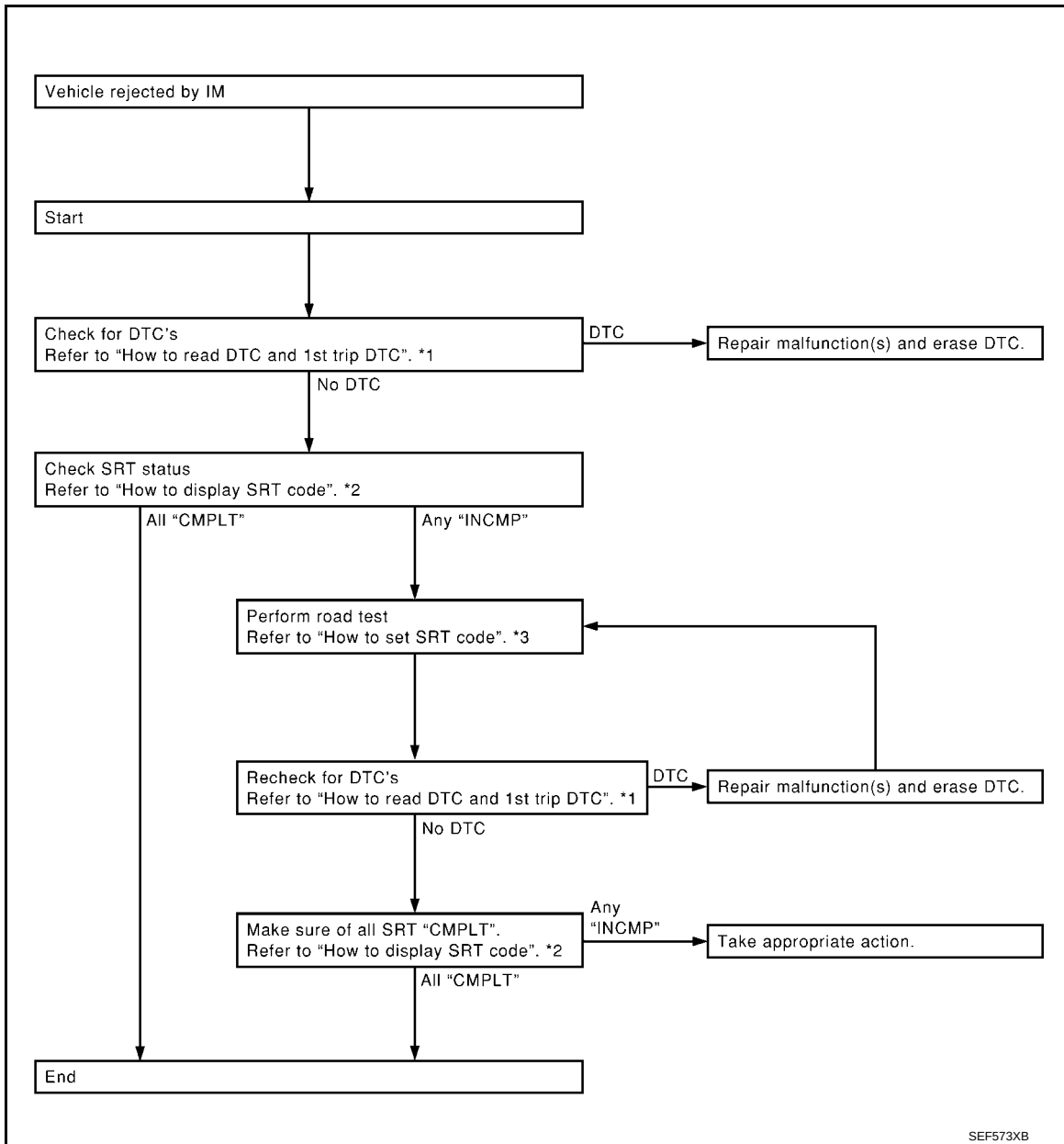
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.



*1 "How to Read DTC and 1st Trip DTC" *2 "How to Display SRT Code"

*3 "How to Set SRT Code"

How to Display SRT Code

WITH CONSULT

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT display for SRT code is shown at right.

"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

WITH GST

Selecting Service \$01 with GST (Generic Scan Tool)

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

ON BOARD DIAGNOSTIC (OBD) SYSTEM

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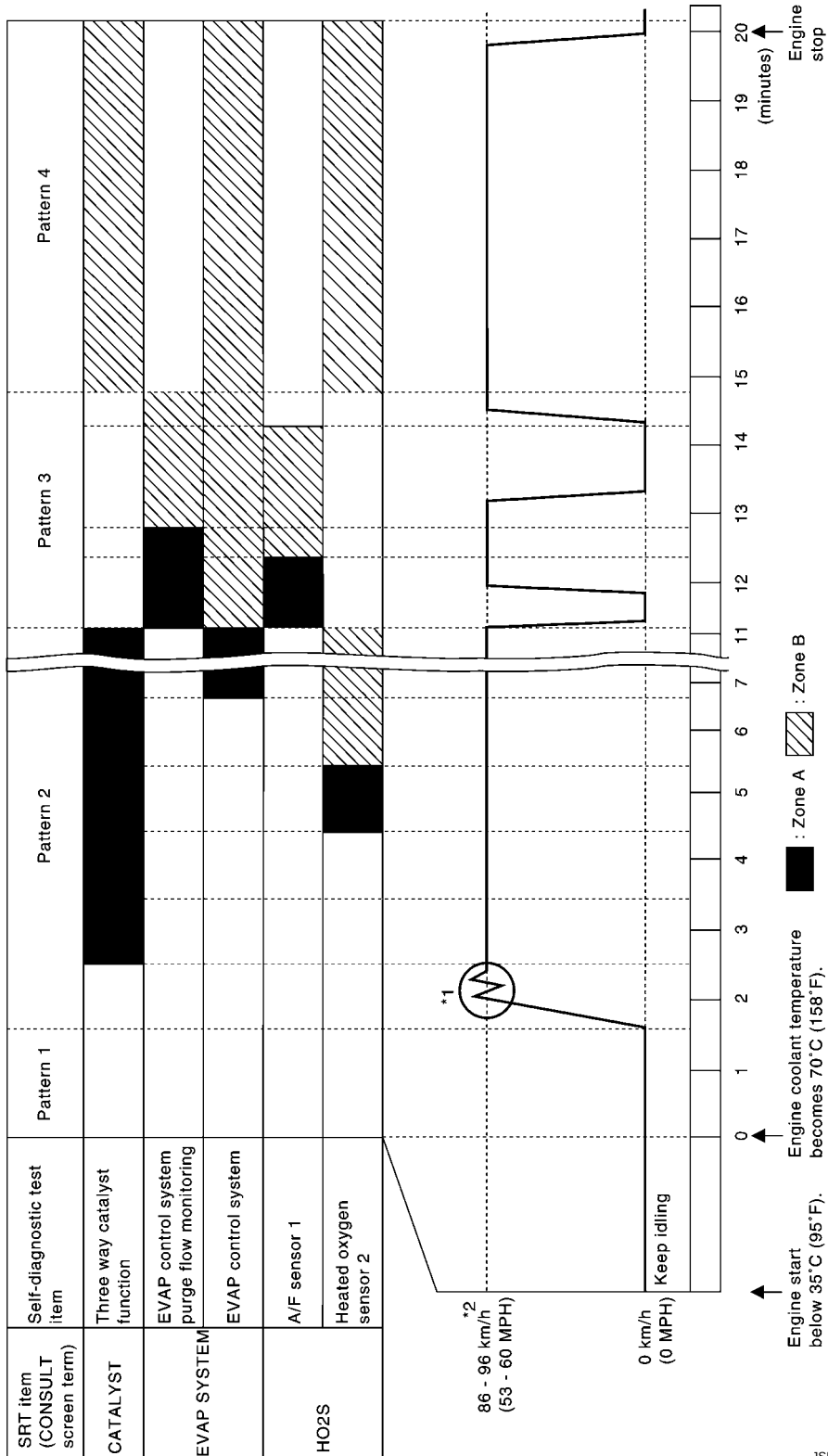
[VQ TYPE 1]

⊗ WITHOUT CONSULT

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

**Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.
Refer to next page for more information and explanation of chart.**



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- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.

Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 73 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 and ground is lower than 1.4V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T models

Set the selector lever in the D position with the overdrive switch turned ON.

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT)

The following is the information specified in Service \$06 of ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014C	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014D	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P014D	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P015A	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
			P015A	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
			P015B	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1
			P015B	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014E	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014F	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P014F	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P015C	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015C	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015D	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
			P015D	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
CATA- LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
Secondary Air	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. The emission related diagnostic information in the ECM can be erased by selecting "All Erase" in the "Description" of "FAINAL CHECK" mode with CONSULT.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service \$04 with GST.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VQ TYPE 1]

< SERVICE INFORMATION >

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Select Service \$04 with GST (Generic Scan Tool).



No Tools

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
 2. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to [EC-68, "Malfunction Indicator Lamp \(MIL\)"](#).
- If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.
 - The following data are cleared when the ECM memory is erased.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

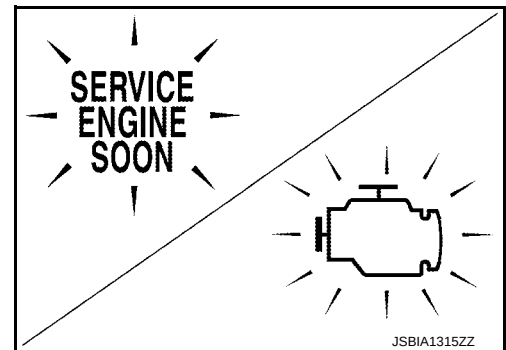
Malfunction Indicator Lamp (MIL)

INFOID:000000005448201

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check. If the MIL does not light up, refer to [DI-28](#), or see [EC-523](#).
2. When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

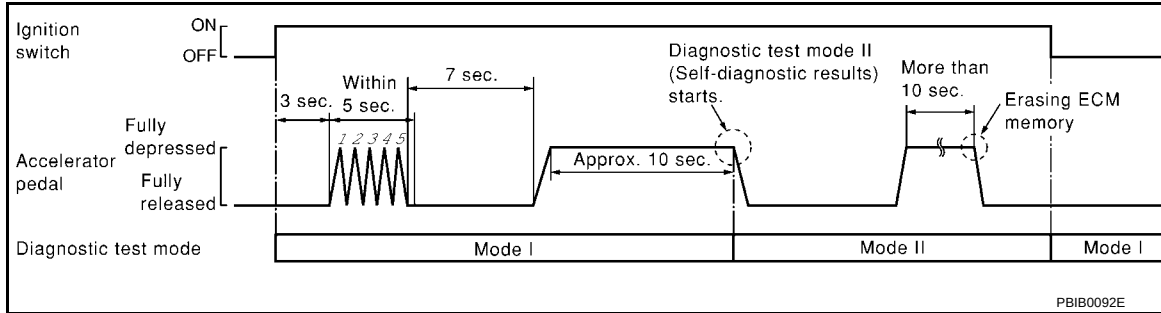
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [DI-28](#) or see [EC-523](#).

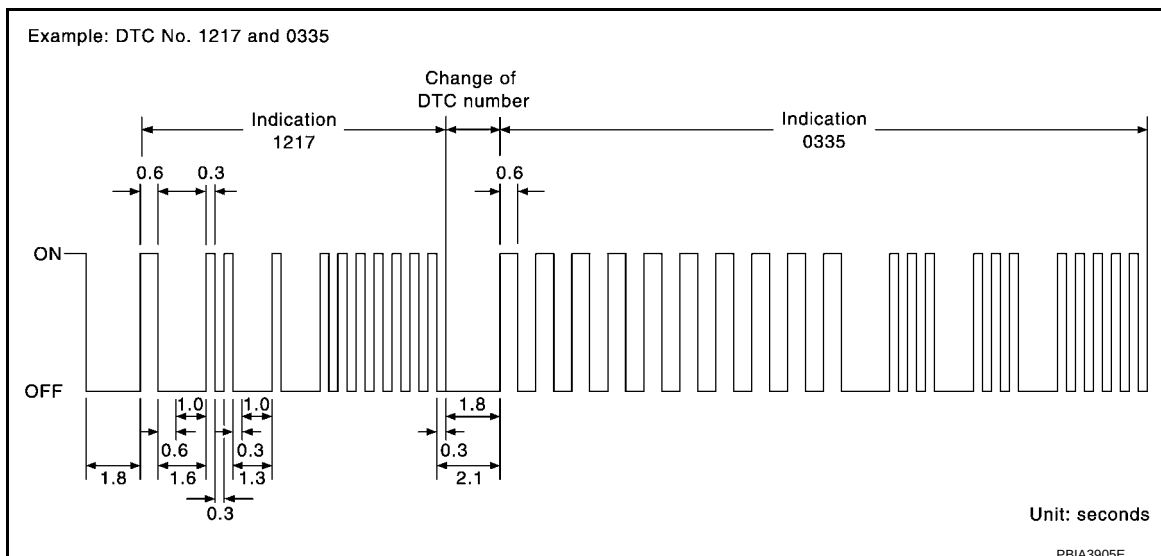
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-24](#))

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".

- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

OBD System Operation Chart

INFOID:000000005448202

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to [EC-52, "Two Trip Detection Logic"](#).
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

*1: Clear timing is at the moment OK is detected.

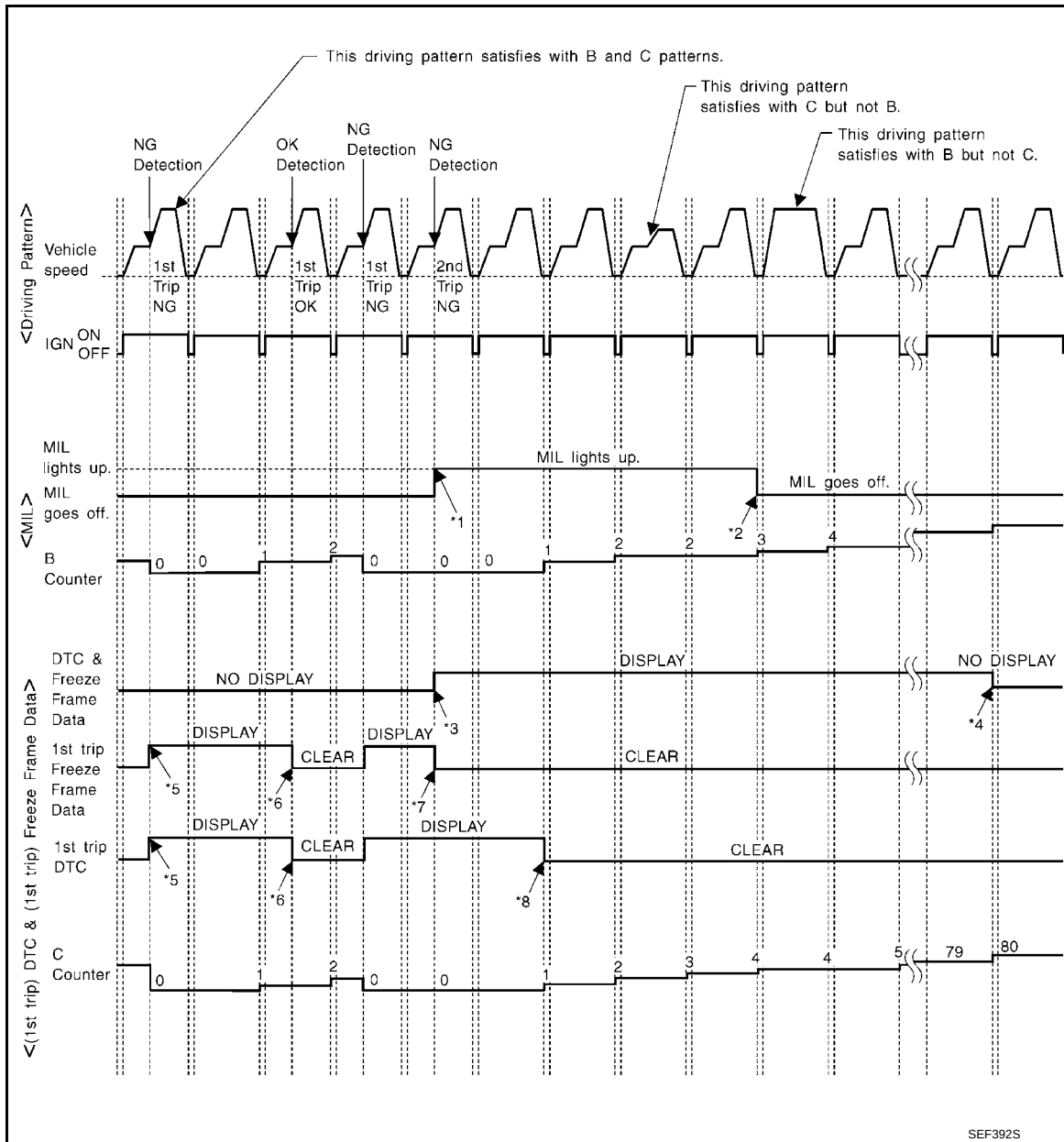
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE " <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VQ TYPE 1]

< SERVICE INFORMATION >

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

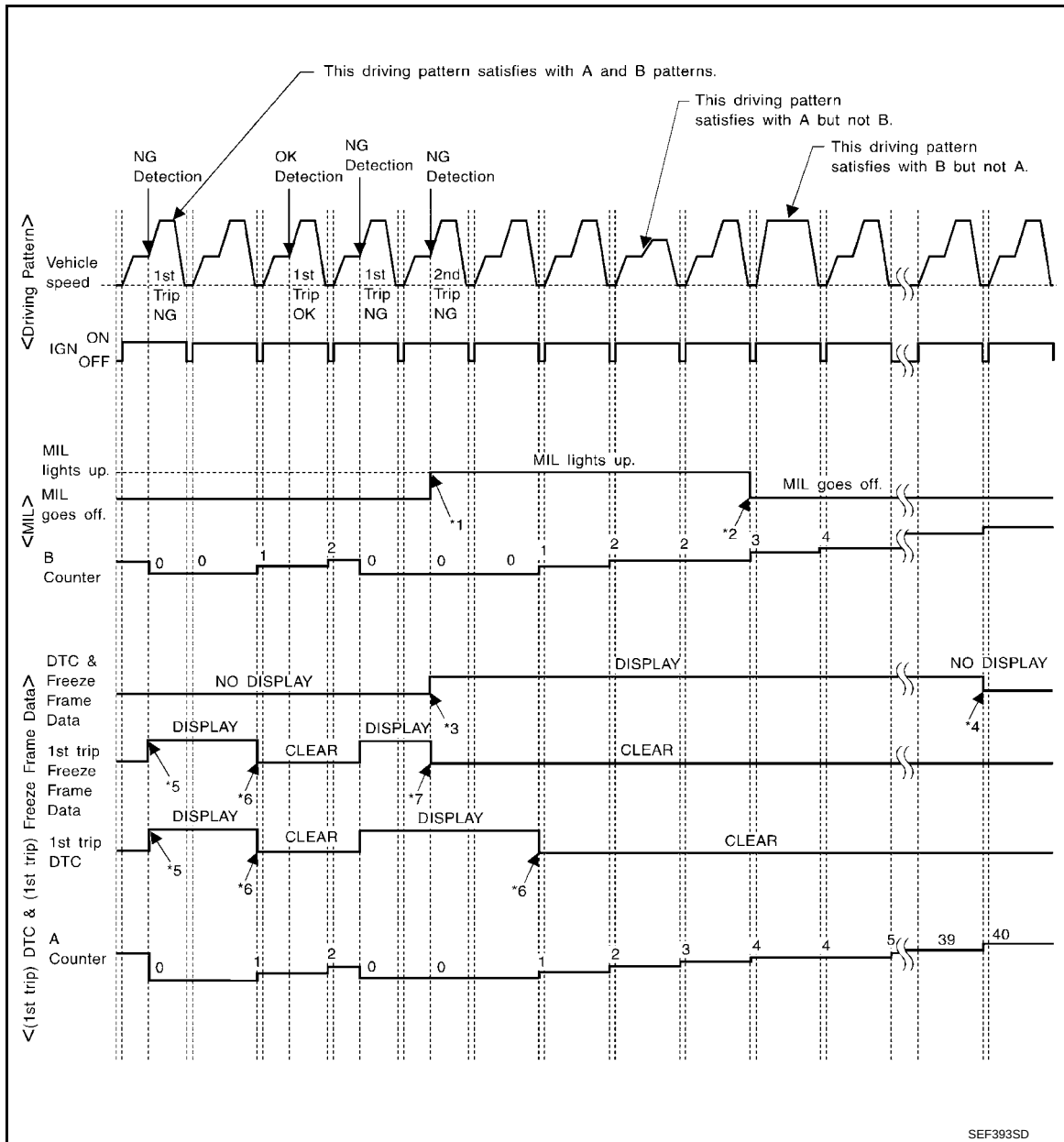
O

P

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

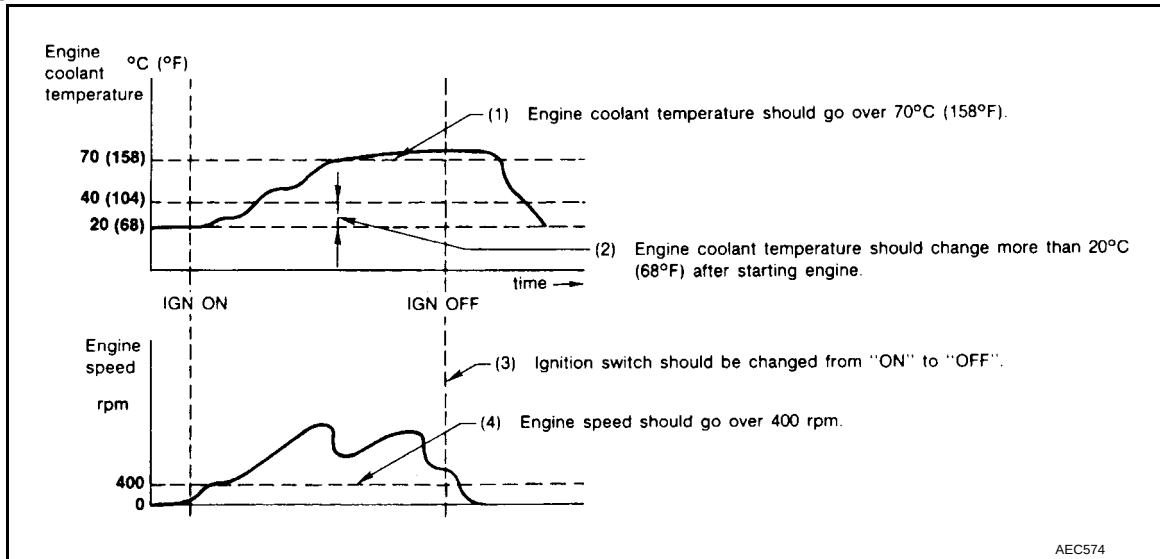
EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 1]

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

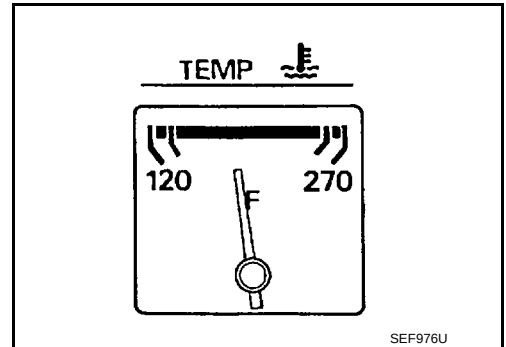
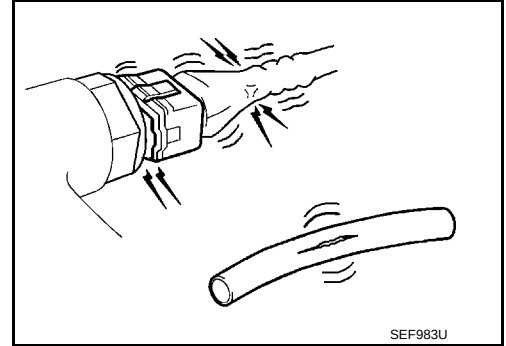
BASIC SERVICE PROCEDURE

Basic Inspection

INFOID:000000005448203

1.INSPECTION START

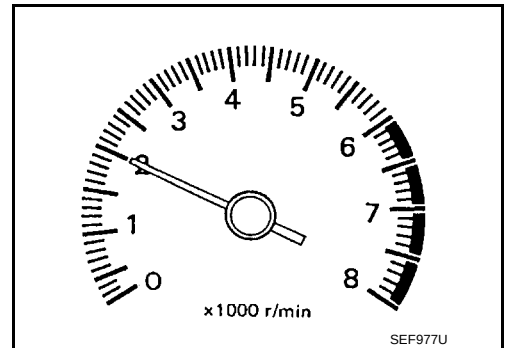
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses for splits, kinks and improper connections
 - Hoses and ducts for leaks
 - Air cleaner clogging
 - Gasket
3. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Rear window defogger switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or GST.

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3.CHECK TARGET IDLE SPEED

Ⓢ With CONSULT

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

BASIC SERVICE PROCEDURE

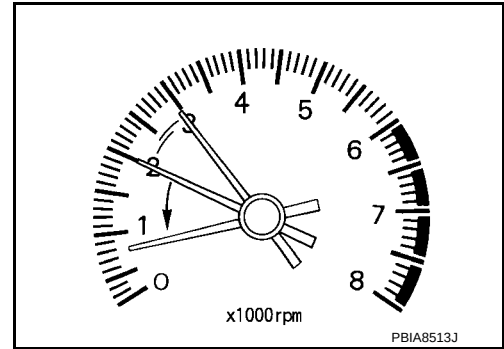
[VQ TYPE 1]

< SERVICE INFORMATION >

- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)



Without CONSULT

- Run engine at about 2,000 rpm for about 2 minutes under no load.
- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed. Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

- OK >> GO TO 10.
NG >> GO TO 4.

4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-82, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

- Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7.CHECK TARGET IDLE SPEED AGAIN

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

OK >> GO TO 10.

NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-248](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-242](#).

OK or NG

OK >> GO TO 9.

NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71. "ECM Re-communicating Function"](#).

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
Refer to [EC-80. "Idle Speed and Ignition Timing Check"](#).

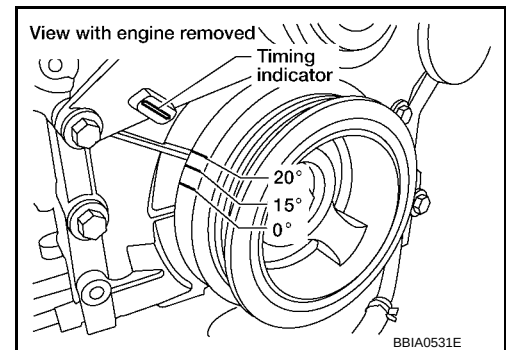
A/T: 15 ± 5° BTDC (in P or N position)

M/T: 15 ± 5° BTDC (in Neutral position)

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC-81. "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-82. "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-82. "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.

No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

OK >> GO TO 15.

NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
Refer to [EC-80, "Idle Speed and Ignition Timing Check"](#).

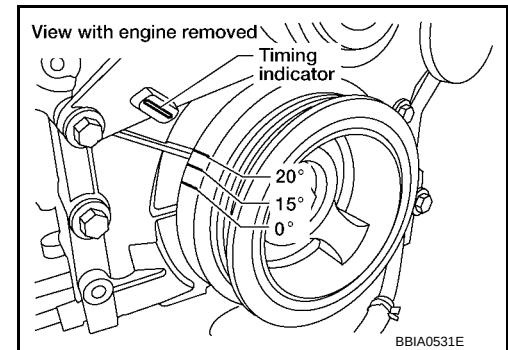
A/T: 15 ± 5° BTDC (in P or N position)

M/T: 15 ± 5° BTDC (in Neutral position)

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-53](#).

OK or NG

OK >> GO TO 17.

NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-248](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-242](#).

OK or NG

OK >> GO TO 18.

NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).

>> GO TO 4.

Idle Speed and Ignition Timing Check

INFOID:000000005448204

IDLE SPEED

 With CONSULT

Check idle speed in "DATA MONITOR" mode with CONSULT.

 With GST

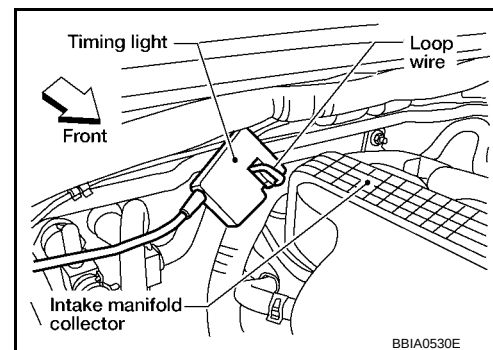
Check idle speed with GST.

IGNITION TIMING

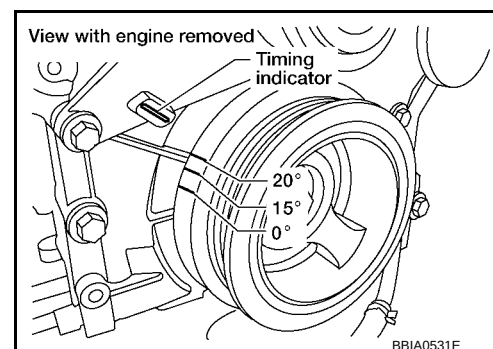
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire as shown.

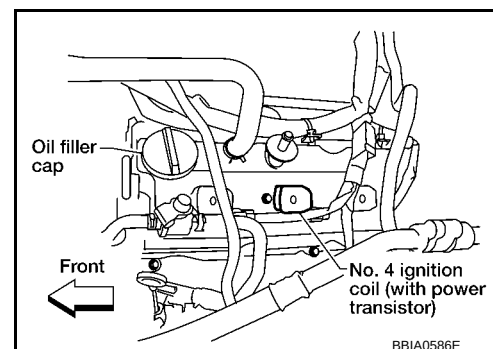


2. Check ignition timing.



Method B

1. Remove No. 4 ignition coil.

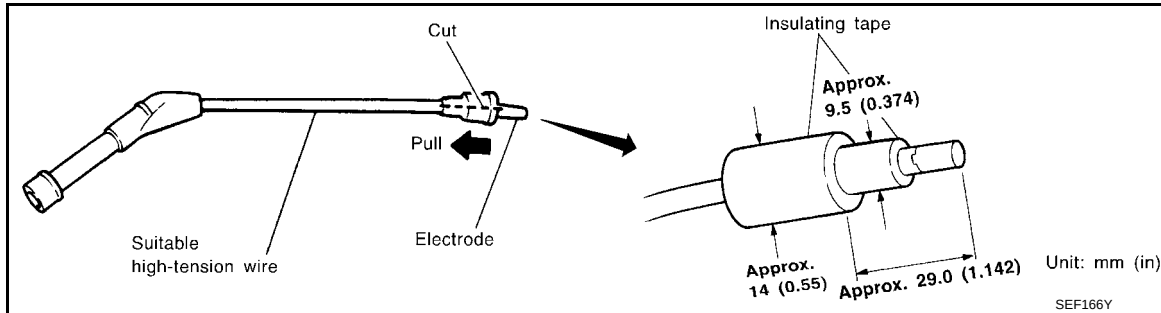
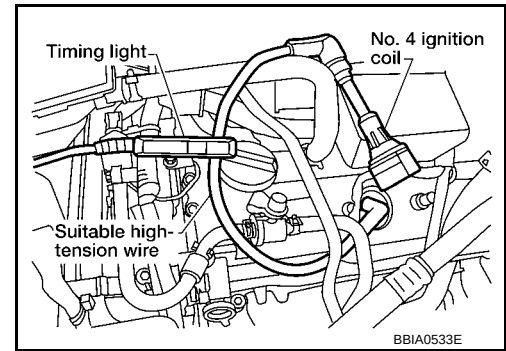


BASIC SERVICE PROCEDURE

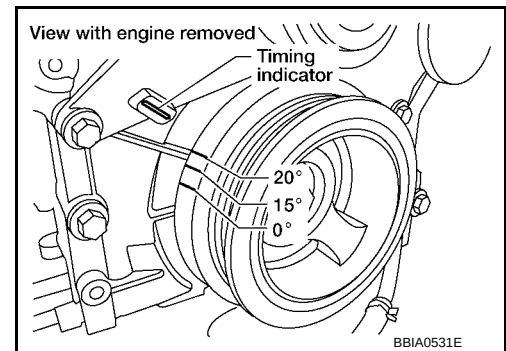
[VQ TYPE 1]

< SERVICE INFORMATION >

2. Connect No. 4 ignition coil and No. 4 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.



3. Check ignition timing.



Procedure After Replacing ECM

INFOID:000000005448205

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-82, "Idle Air Volume Learning"](#).

Accelerator Pedal Released Position Learning

INFOID:000000005448206

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

INFOID:000000005448207

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

INFOID:000000005448208

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
 - A/T models
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- Without CONSULT: Drive vehicle for 10 minutes.
 - M/T models
- Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT

1. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
6. Touch "START" and wait 20 seconds.
7. Make sure that "CMPLT" is displayed on CONSULT screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION

BASIC SERVICE PROCEDURE

[VQ TYPE 1]

< SERVICE INFORMATION >

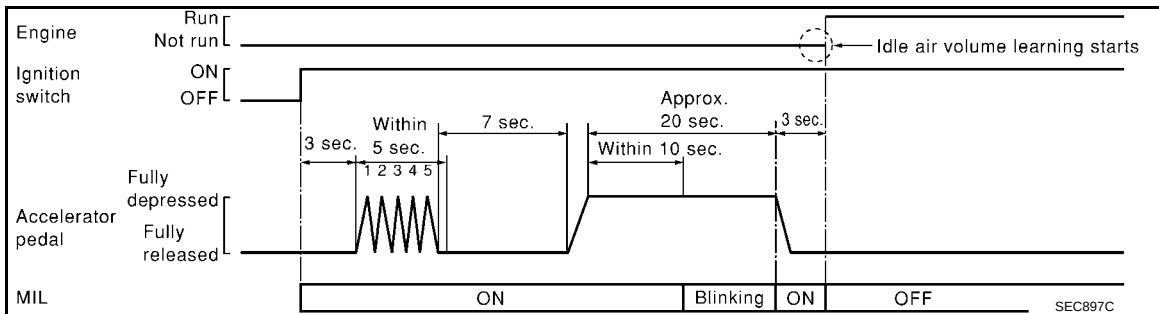
Idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

⊗ Without CONSULT

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

1. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, then turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.
11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. Check that throttle valve is fully closed.
2. Check PCV valve operation.
3. Check that downstream of throttle valve is free from air leakage.
4. When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident. It is useful to perform [EC-132](#).

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

[VQ TYPE 1]

5. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:
 - Engine stalls.
 - Erroneous idle.

Fuel Pressure Check

INFOID:000000005448209

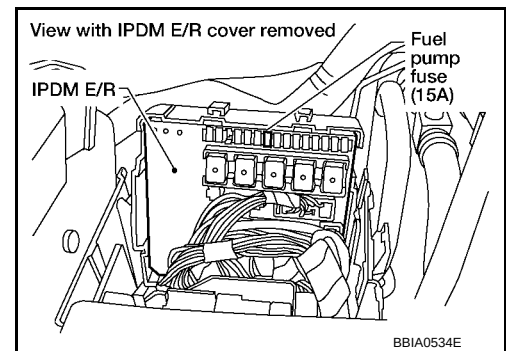
FUEL PRESSURE RELEASE

With CONSULT

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

Without CONSULT

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

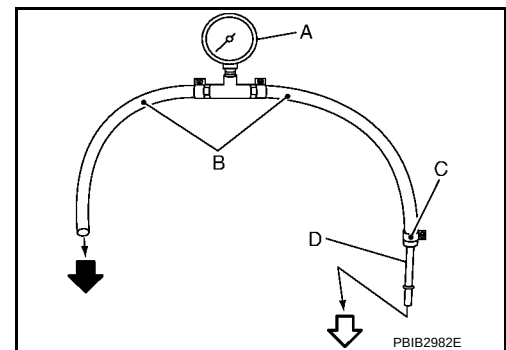
CAUTION:

- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because D40 models do not have fuel return system.

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
 -  To quick connector
 -  To fuel tube (engine side)
 - C: Clamp
 - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
 - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
 - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
 - Use Pressure Gauge to check fuel pressure.
3. Remove fuel hose. Refer to [EM-36](#).
 - Do not twist or kink fuel hose because it is plastic hose.

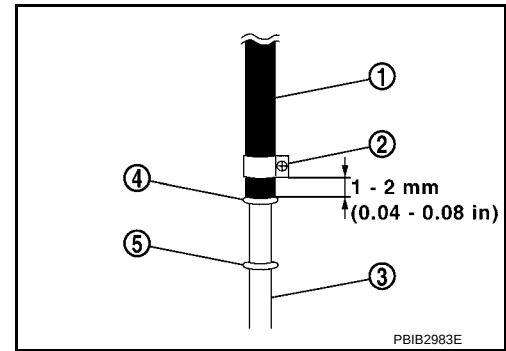


BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

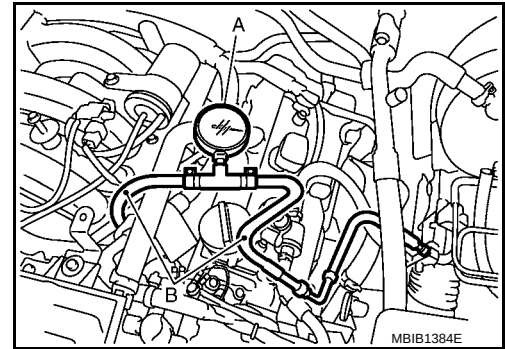
[VQ TYPE 1]

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
5. Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm², 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.
If NG, repair or replace.

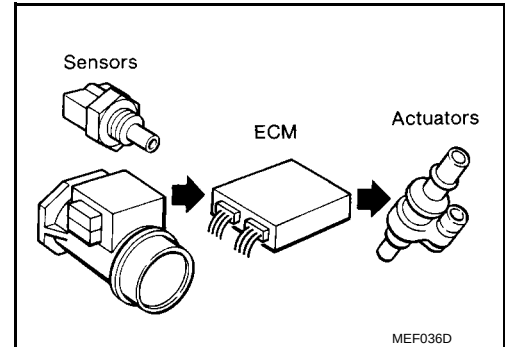
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

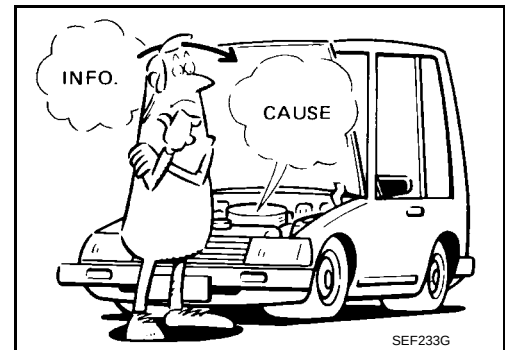
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INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



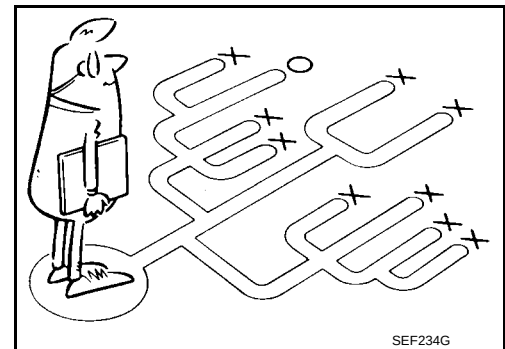
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT (or GST) or a circuit tester connected should be performed. Follow the Work Flow on "Work Flow".

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



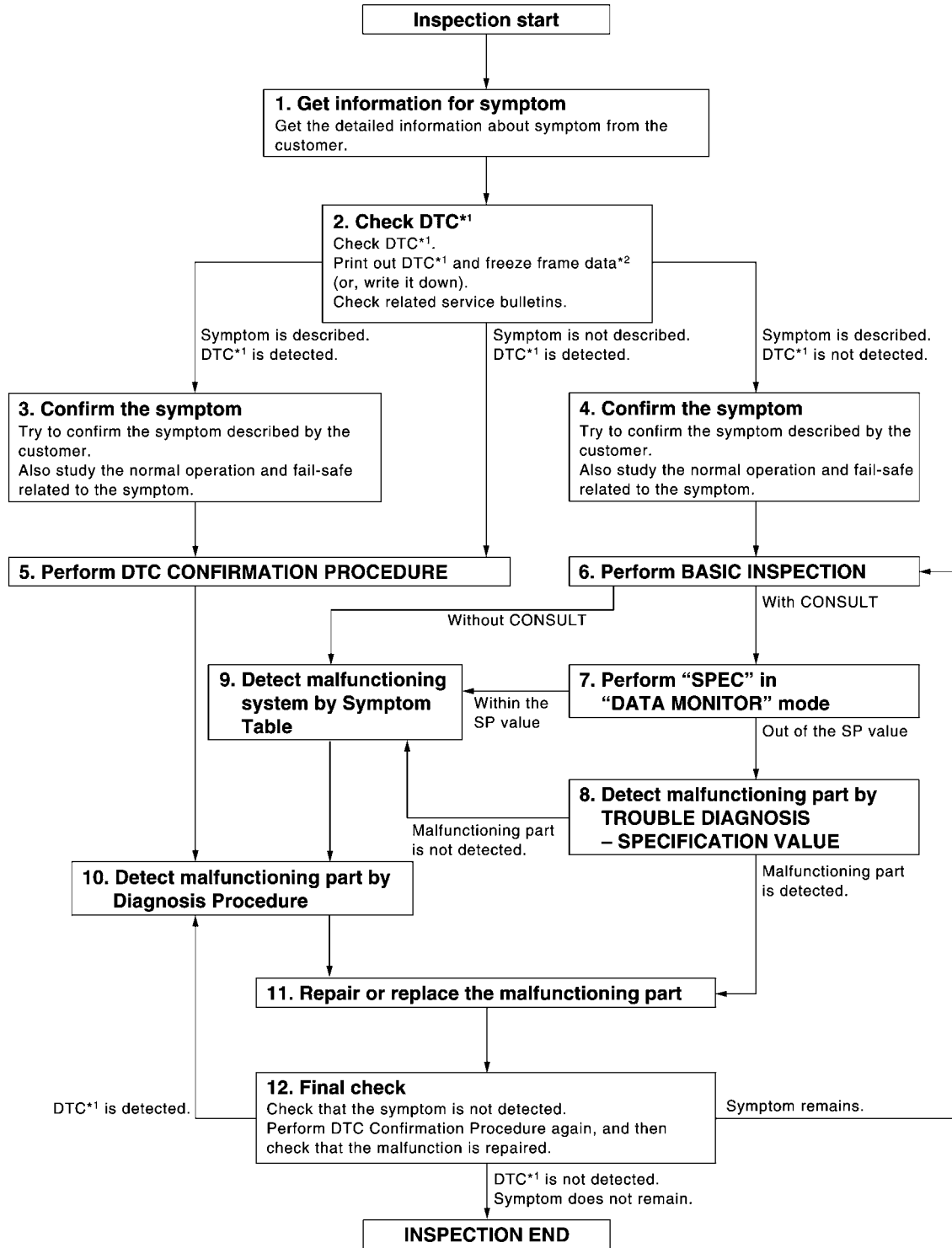
WORK FLOW

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Overall Sequence



*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

JSBIA1228GB

Detailed Flow

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "DIAGNOSTIC WORKSHEET".

>> GO TO 2.

< SERVICE INFORMATION >

2. CHECK DTC*¹

1. Check DTC*¹.
2. Perform the following procedure if DTC*¹ is displayed.
 - Record DTC*¹ and freeze frame data*². (Print them out with CONSULT or GST.)
 - Erase DTC*¹. (Refer to [EC-53, "Emission-related Diagnostic Information"](#).)
 - Study the relationship between the cause detected by DTC*¹ and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-93](#).)
3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*¹ is displayed>>GO TO 3.

Symptom is described, DTC*¹ is not displayed>>GO TO 4.

Symptom is not described, DTC*¹ is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*¹, and then make sure that DTC*¹ is detected again.

At this time, always connect CONSULT to the vehicle, and check diagnostic results in real time on "DATA MONITOR (AUTO TRIG)".

If two or more DTCs*¹ are detected, refer to [EC-91, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data*² is useful if the DTC*¹ is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*¹ cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC*¹ by DTC Confirmation Procedure.

Is DTC*¹ detected?

Yes >> GO TO 10.

No >> Check according to [EC-140](#).

6. PERFORM BASIC INSPECTION

Perform [EC-76, "Basic Inspection"](#).

With CONSULT>>GO TO 7.

Without CONSULT>>GO TO 9.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL", and "A/F ALPHA-B1", "A/F ALPHA-B2" are within the SP value using CONSULT "DATA MONITOR (SPEC)" mode. Refer to [EC-132, "Diagnosis Procedure"](#).

Are they within the SP value?

- Yes >> GO TO 9.
- No >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC-132](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to [EC-93, "Symptom Matrix Chart"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:

The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-126, "CONSULT Reference Value in Data Monitor Mode"](#), [EC-108, "ECM Terminal and Reference Value"](#).

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to [EC-53, "Emission-related Diagnostic Information"](#).

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*¹ is detected) >> GO TO 10.

NG (Symptom remains) >> GO TO 6.

- OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*¹ in ECM. (Refer to [EC-53, "Emission-related Diagnostic Information"](#).)
- 2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
- 3. **INSPECTION END**

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

SEF907L

[VQ TYPE 1]

Worksheet Sample

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

LEC031A

INFOID:0000000005448211

NOTE:

EC-91

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Priority	Detected items (DTC)
1	• U1000 U1001 CAN communication line • P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0345 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P0705 P1706 Park/Neutral position (PNP) signal • P1229 Sensor power supply • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater • P0138 P0139 P0158 P0159 P1146 P1147 P1166 P1167 Heated oxygen sensor 2 • P0444 P0445 EVAP canister purge volume control solenoid valve • P0550 Power steering pressure sensor • P0700 P0720 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P1716 P1730 P1752 P1757 P1762 P1767 P1774 A/T related sensors, solenoid valves and switches • P1031 P1032 P1051 P1052 Air fuel ratio (A/F) sensor 1 heater • P1065 ECM power supply • P1111 P1136 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 P1128 Electric throttle control actuator • P1217 Engine over temperature (OVERHEAT) • P1271 P1272 P1273 P1274 P1276 P1278 P1279 P1281 P1282 P1283 P1284 P1286 P1288 P1289 Air fuel ratio (A/F) sensor 1 • P1805 Brake switch
3	• P0011 P0021 Intake valve timing control • P0171 P0172 P0174 P0175 Fuel injection system function • P0300 - P0306 Misfire • P0420 P0430 Three way catalyst function • P1121 Electric throttle control actuator • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor

Fail-Safe Chart

INFOID:000000005448212

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes or more after engine starting.	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. (When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less. (When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

INFOID:000000005448213

SYSTEM — BASIC ENGINE CONTROL SYSTEM

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

		SYMPTOM												Reference page												
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)											
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA												
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-494											
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-84											
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-488											
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-45											
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-49											
	Incorrect idle speed adjustment						1	1	1	1		1			EC-76											
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-294 , EC-296											
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-76											
	Ignition circuit	1	1	2	2	2		2	2			2			EC-499											
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-141											
Mass air flow sensor circuit		1			2										EC-163											
Engine coolant temperature sensor circuit															3			EC-174								
Air fuel ratio (A/F) sensor			1	2	3	2		2	2			2			EC-351 EC-359 EC-367 EC-376 EC-385 EC-393 EC-402											
Throttle position sensor circuit																2			2							EC-179 , EC-224 , EC-340 , EC-342 , EC-455
Accelerator pedal position sensor circuit																										3
Knock sensor circuit				2								3			EC-237											
Crankshaft position sensor (POS) circuit		2	2												EC-242											
Camshaft position sensor (PHASE) circuit		3	2												EC-248											
Vehicle speed signal circuit			2	3		3						3			EC-267											
Power steering pressure sensor circuit			2					3	3						EC-269											

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-274 , EC-283
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-287
PNP signal circuit			3		3		3	3			3			EC-430
VIAS control solenoid valve circuit					1									EC-516
Refrigerant pressure sensor circuit		2				3			3		4			EC-511
Electrical load signal circuit							3							EC-481
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-155 , MTC-29
ABS actuator and electric unit (control unit)			4											BRC-10

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

		SYMPTOM													Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATSWATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel tank	5	5												FL-6	
	Fuel piping			5	5	5		5	5			5			FL-4	
	Vapor lock															—
	Valve deposit															—
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5				—
Air	Air duct		5												EM-16	
	Air cleaner														EM-16	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)			5		5		5	5			5				EM-16
	Electric throttle control actuator	5			5		5			5						EM-18
	Air leakage from intake manifold/Collector/Gasket															EM-18 , EM-21
Cranking	Battery	1	1	1		1		1	1					1	SC-4	
	Generator circuit														SC-13	
	Starter circuit	3										1			SC-35	
	Signal plate	6													EM-104	
	PNP signal	4													MT-13 , AT-117	
Engine	Cylinder head	5	5	5	5	5		5	5		4	5	3		EM-88	
	Cylinder head gasket															
	Cylinder block														EM-104	
	Piston											4				
	Piston ring	6	6	6	6		6	6		6	6					
	Connecting rod															
	Bearing															
	Crankshaft															
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5	3		EM-53	
	Camshaft														EM-71	
	Intake valve timing control														EM-53	
	Intake valve														EM-88	
	Exhaust valve															

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

		SYMPTOM												Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5		EM-23 , EX-3
	Three way catalyst													
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5		EM-28 , LU-12 , LU-9 , LU-10
	Oil level (Low)/Filthy oil													LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5	5	5	5		4	5		CO-13
	Thermostat									5				CO-28
	Water pump													CO-23
	Water gallery													CO-30
	Cooling fan									5				CO-21
	Coolant level (Low)/Contaminated coolant									5				CO-10
NATS (Nissan Anti-theft system)		1	1											BL-70 or EC-51

1 - 6: The numbers refer to the order of inspection.

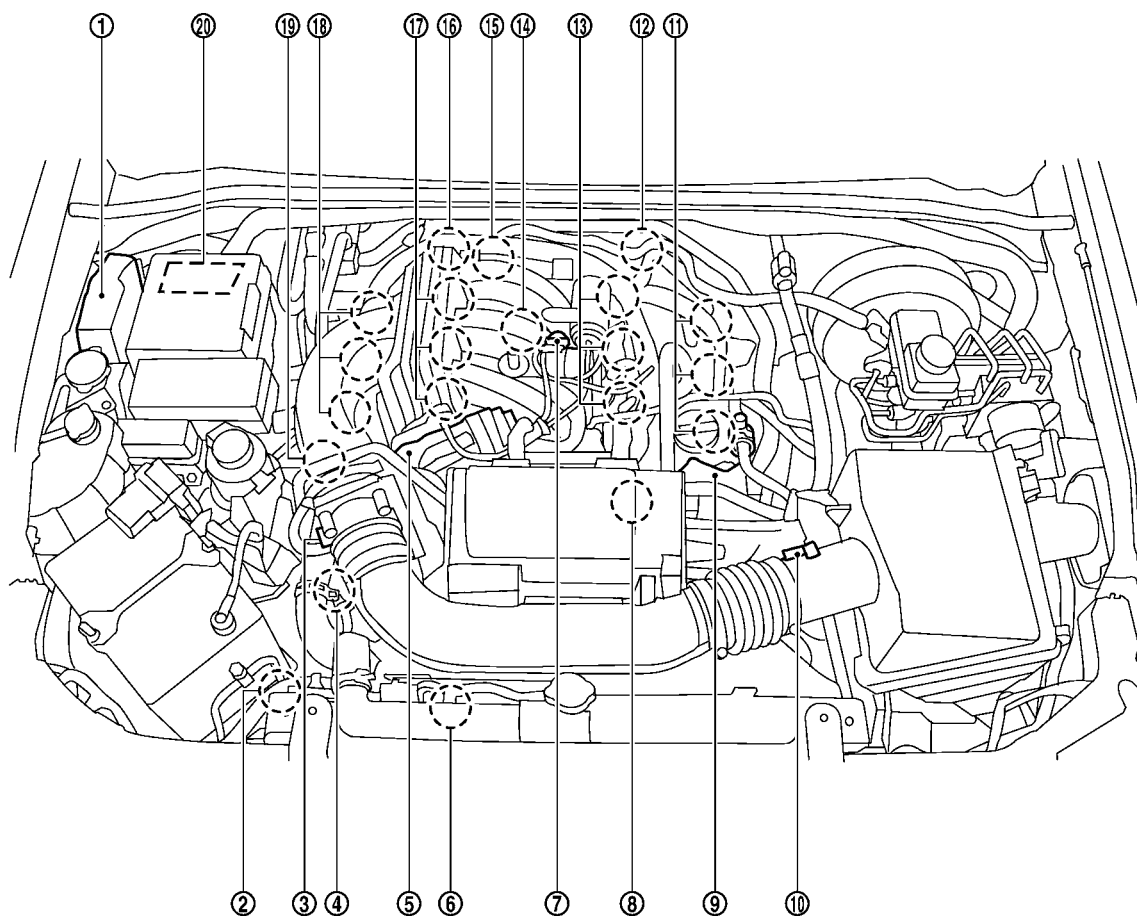
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Engine Control Component Parts Location

INFOID:000000005448214



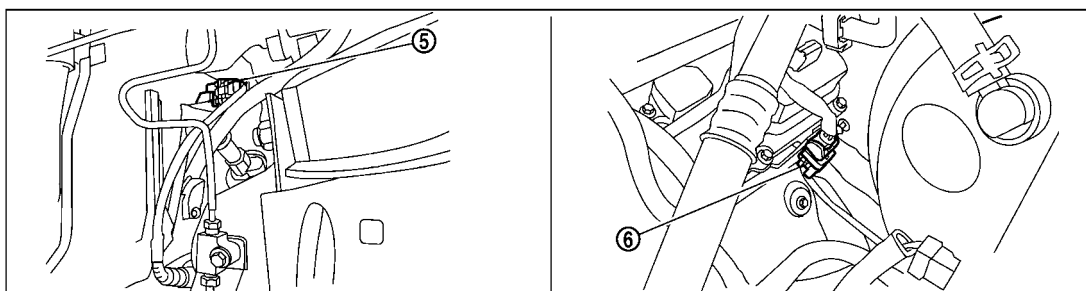
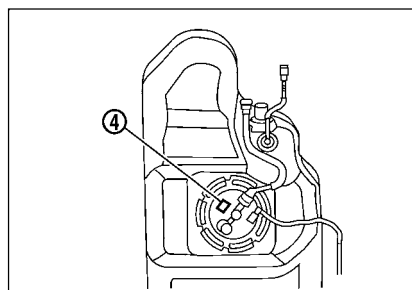
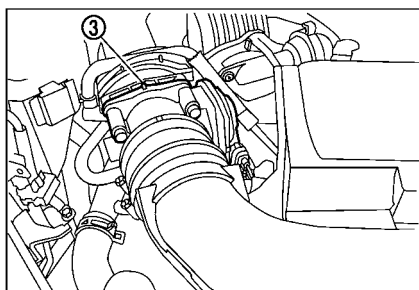
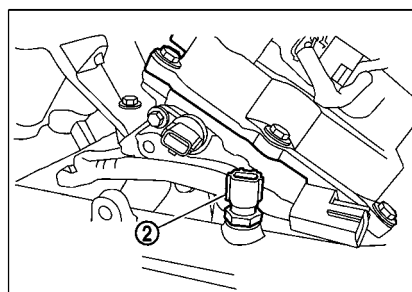
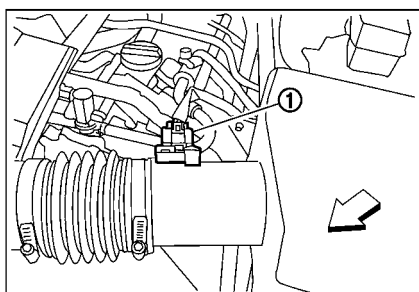
MB1B1270E

1. ECM	2. Refrigerant pressure sensor	3. Electric throttle control actuator
4. Power steering pressure sensor	5. Power valve actuator	6. Cooling fan motor
7. VIAS control solenoid valve	8. EVAP canister purge volume control solenoid valve	9. Intake valve timing control solenoid valve (bank 2)
10. Mass air flow sensor (with intake air temperature sensor)	11. Ignition coil (with power transistor) and spark plug (bank 2)	12. Camshaft position sensor (PHASE) (bank 2)
13. Fuel injector (bank 2)	14. Knock sensor	15. Camshaft position sensor (PHASE) (bank 1)
16. Engine coolant temperature sensor	17. Fuel injector (bank 1)	18. Ignition coil (with power transistor) and spark plug (bank 1)
19. Intake valve timing control solenoid valve (bank 1)	20. IPDM E/R	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]



MB1B1271E

⇐ : Vehicle front

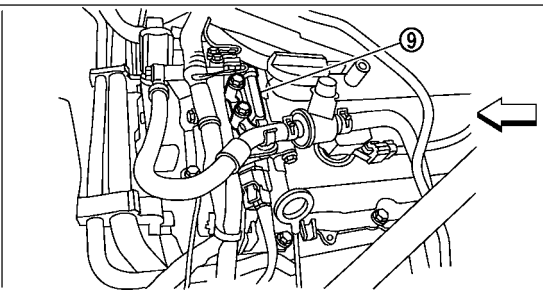
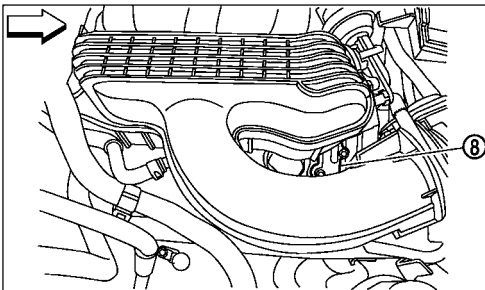
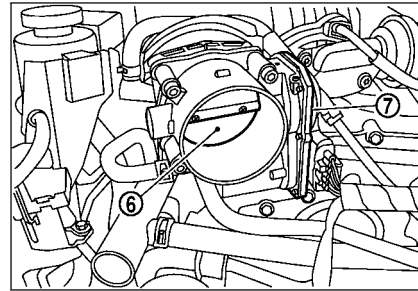
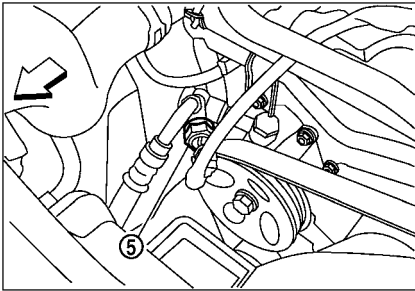
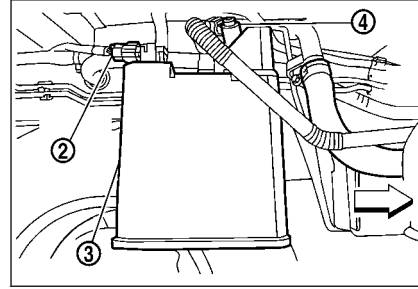
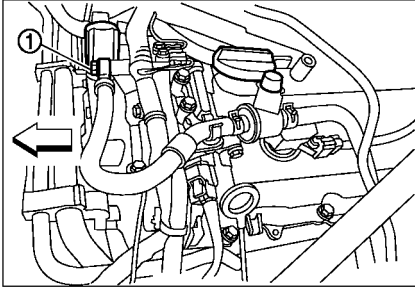
1. Mass air flow sensor	2. Engine coolant temperature sensor	3. Electric throttle control actuator
4. Fuel level sensor unit and fuel pump harness connector	5. Air fuel ratio (A/F) sensor 1 (bank 1) harness connector	6. Air fuel ratio (A/F) sensor 1 (bank 2) harness connector

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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]



MBIB1409E

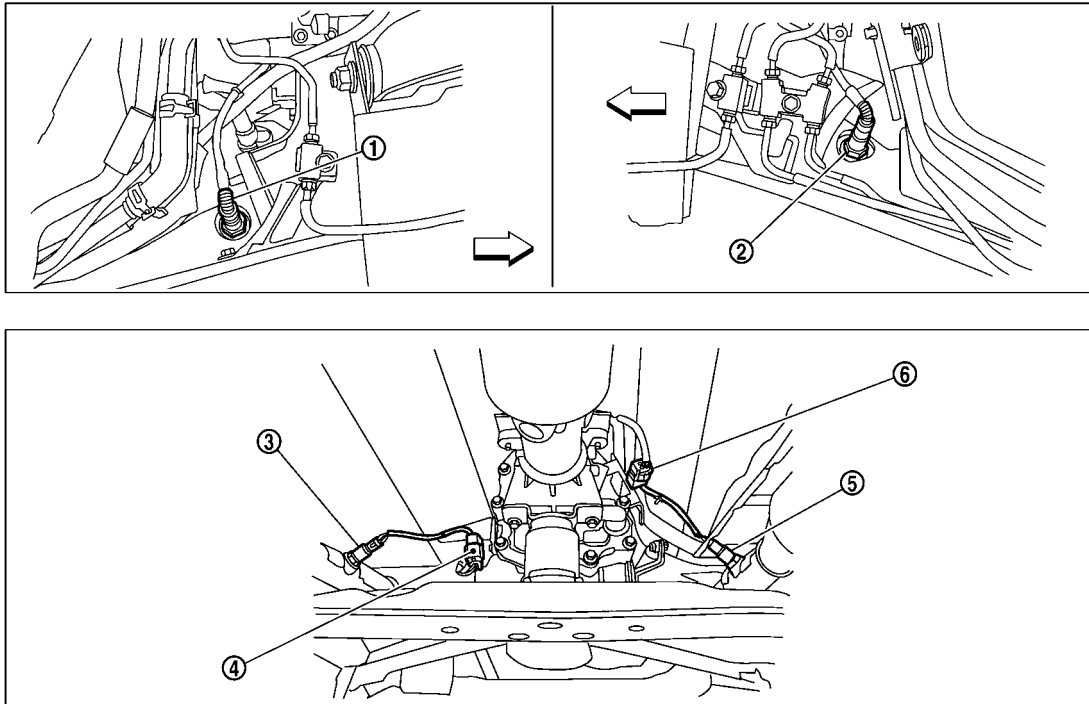
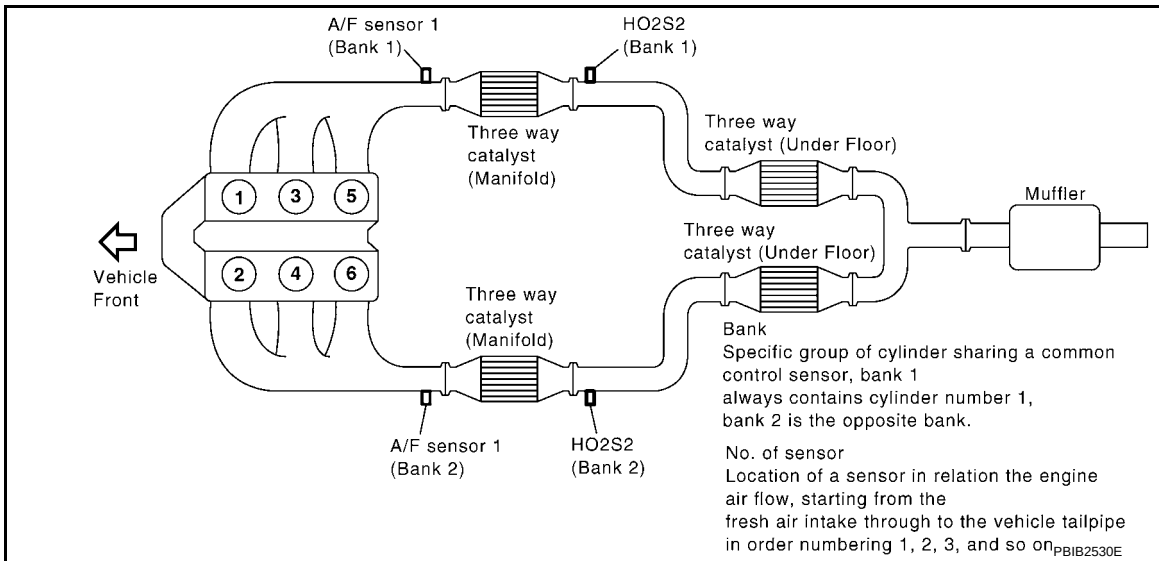
↩ : Vehicle front

1. EVAP canister purge volume control solenoid valve	2. EVAP control system pressure sensor	3. EVAP canister
4. EVAP canister vent control valve	5. Power steering pressure sensor	6. Throttle valve
7. Electric throttle control actuator	8. Intake valve timing control solenoid valve (bank 1)	9. Intake valve timing control solenoid valve (bank 2)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]



MBIB1273E

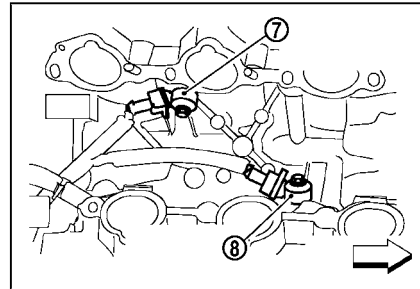
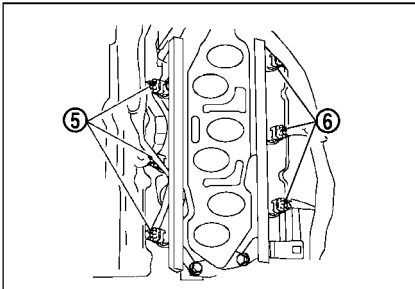
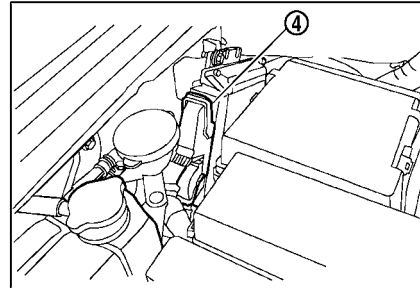
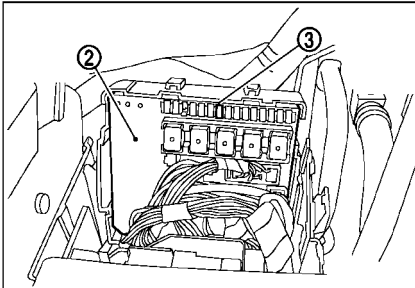
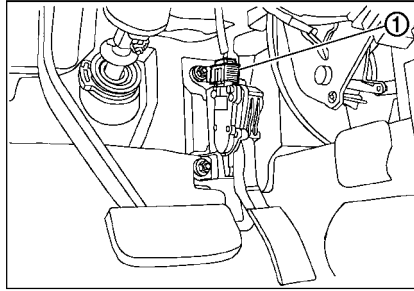
← : Vehicle front

1. Air fuel ratio (A/F) sensor 1 (bank 1)	2. Air fuel ratio (A/F) sensor 1 (bank 2)	3. Heated oxygen sensor 2 (bank 2)
4. Heated oxygen sensor 2 (bank 2) harness connector	5. Heated oxygen sensor 2 (bank 1)	6. Heated oxygen sensor 2 (bank 1) harness connector

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]



MB1B1274E

⇐ : Vehicle front

1. Accelerator pedal position sensor harness connector
4. ECM harness connectors
7. Knock sensor (bank 2)

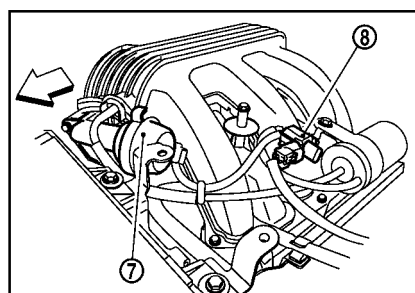
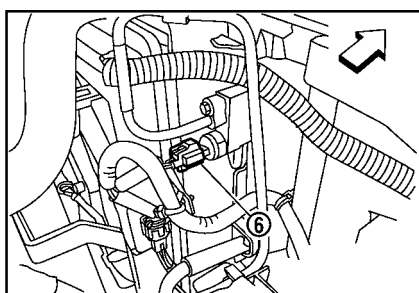
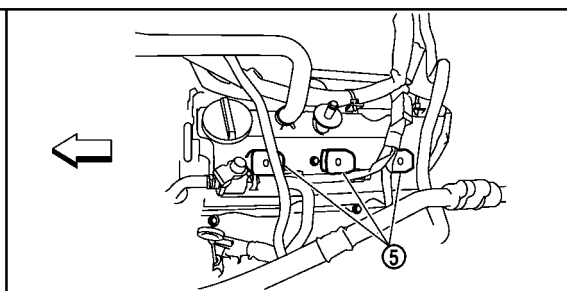
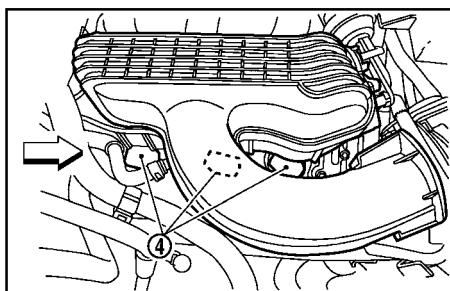
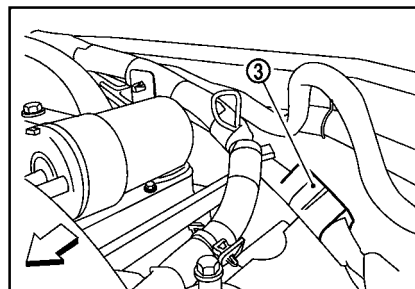
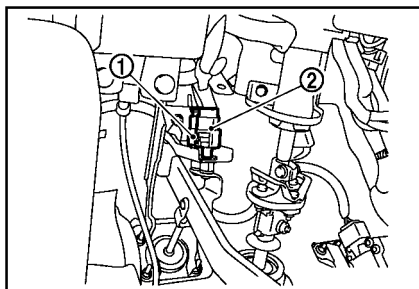
2. IPDM E/R
5. Fuel injector (bank 1) harness connector
8. Knock sensor (bank 1)

3. Fuel pump fuse (15A)
6. Fuel injector (bank 2) harness connector

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]



MBIB1275E

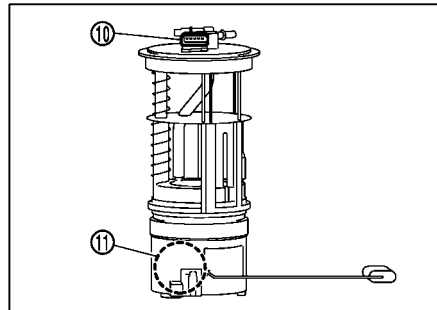
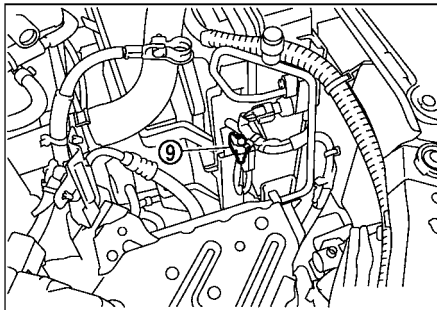
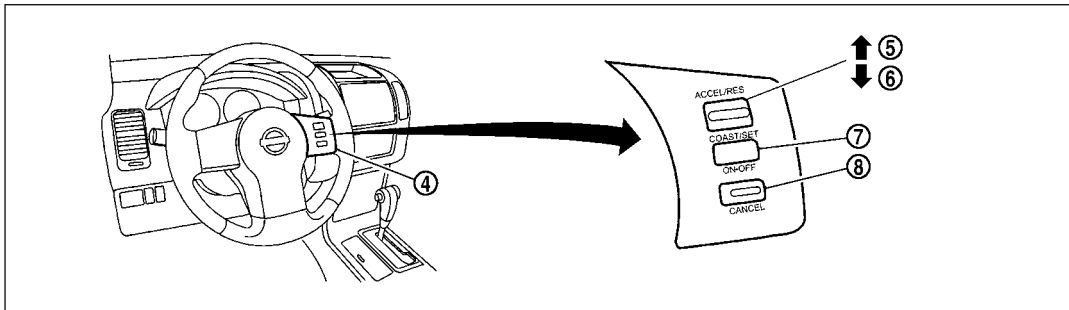
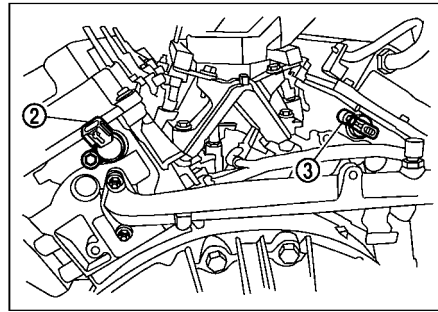
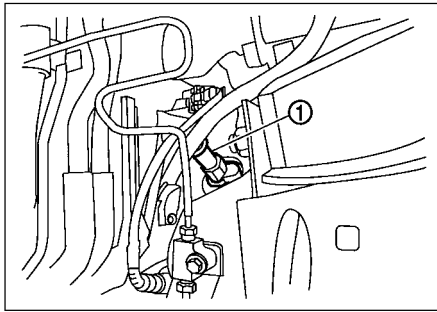
⇐ : Vehicle front

1. ASCD brake switch	2. Stop lamp switch	3. Condenser-1
4. Ignition coil (with power transistor) (bank 1)	5. Ignition coil (with power transistor) (bank 2)	6. Refrigerant pressure sensor harness connector
7. Power valve actuator	8. VIAS control solenoid valve	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

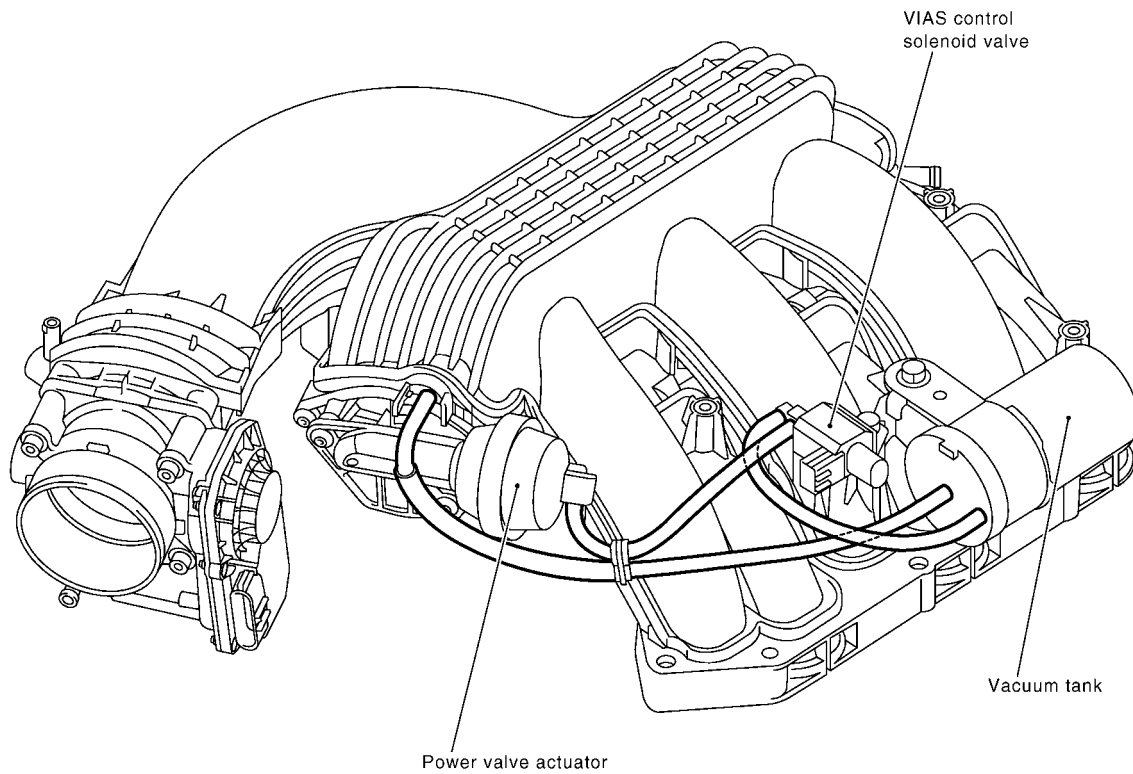


MB1B1276E

1. Crankshaft position sensor (POS)	2. Camshaft position sensor (PHASE) (bank 2)	3. Camshaft position sensor (PHASE) (bank 1)
4. ASCD steering switch	5. RESUME/ACCELERATE switch	6. SET/COAST switch
7. MAIN switch	8. CANCEL switch	9. Cooling fan control motor harness connector
10. Fuel level sensor unit and fuel pump	11. Fuel pressure regulator	

Vacuum Hose Drawing

INFOID:000000005448215



NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

Refer to [EC-36, "Schematic"](#) for Vacuum Control System.

PBIB2529E

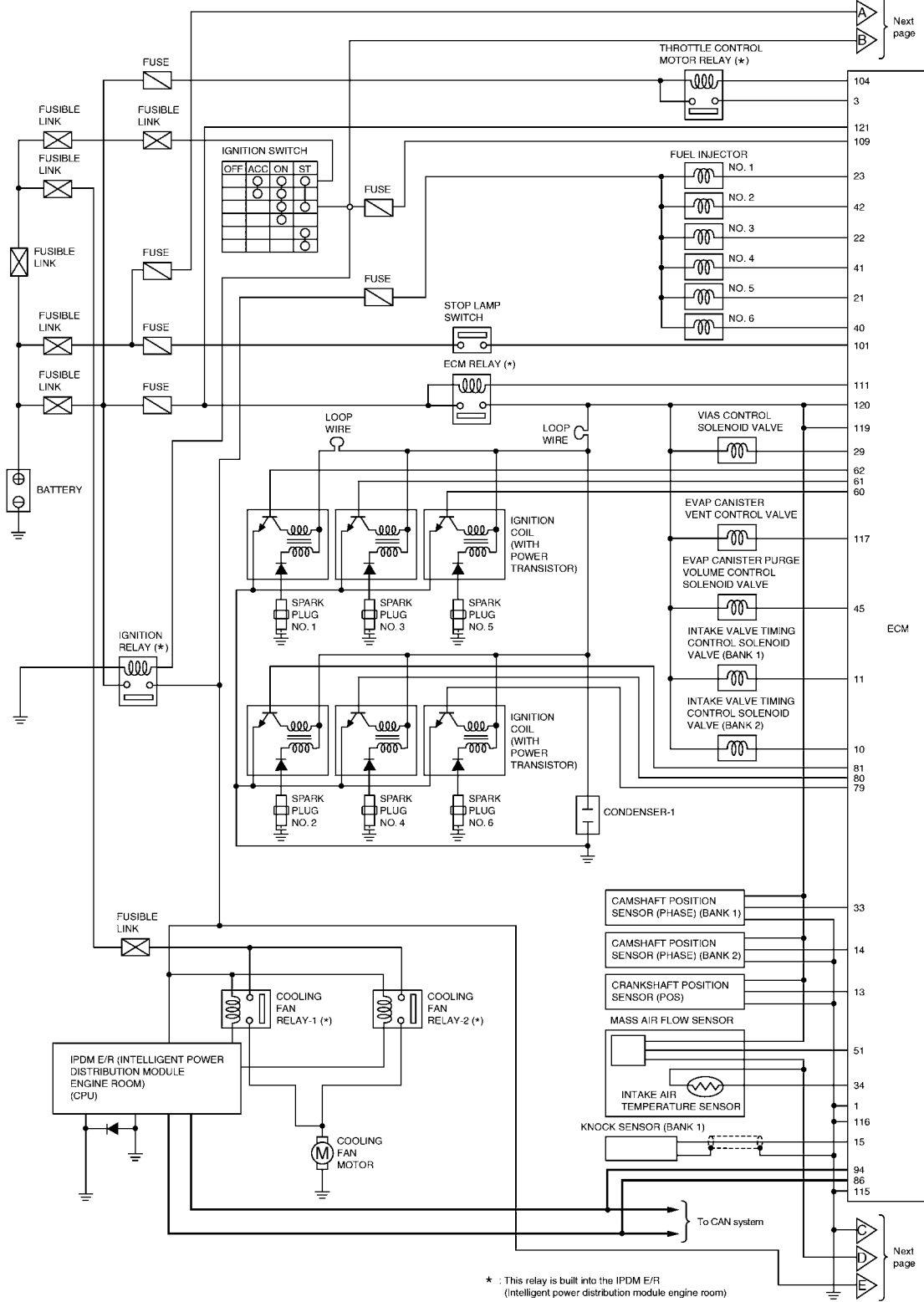
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[VQ TYPE 1]

Circuit Diagram

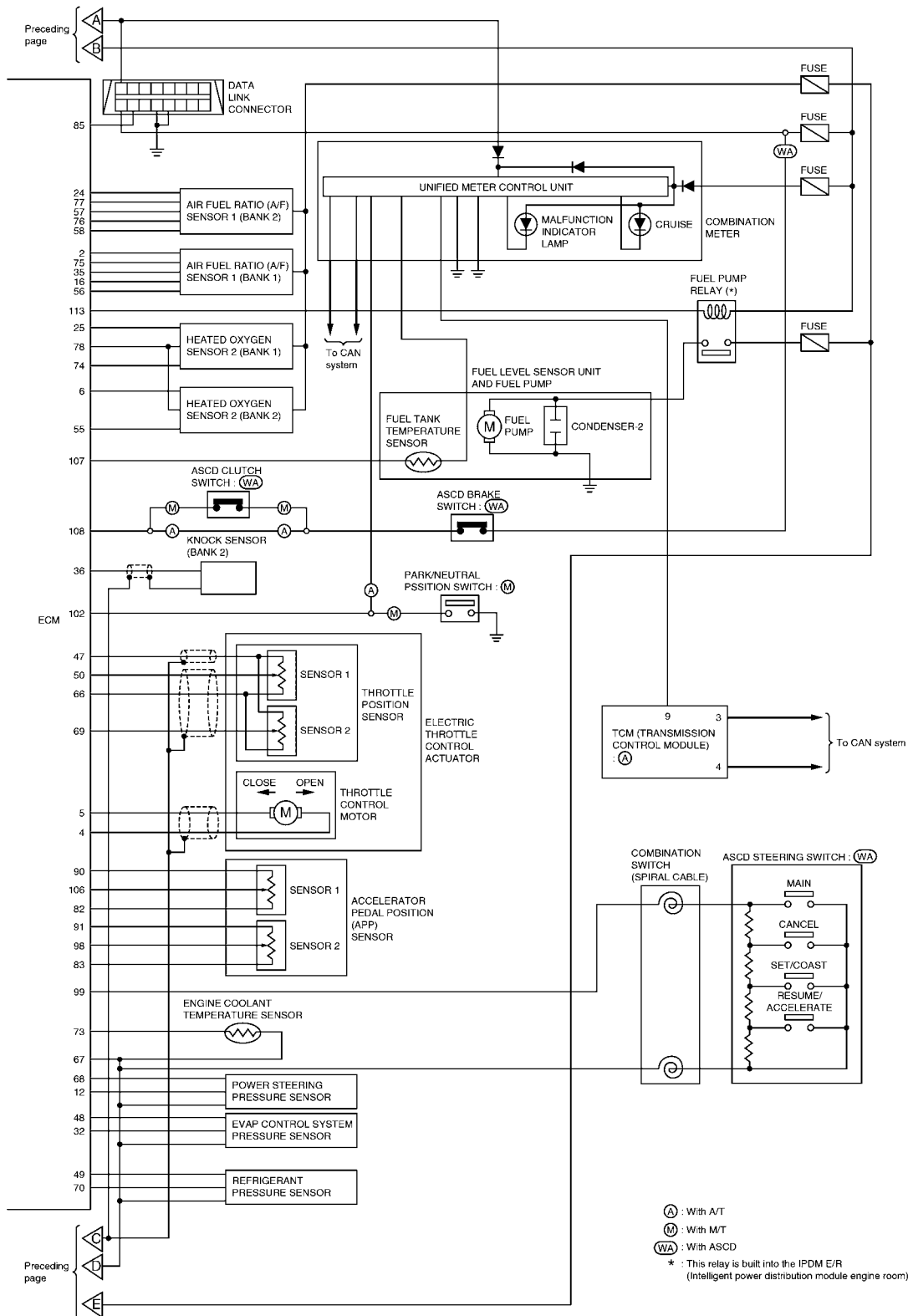
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[VQ TYPE 1]



JMBWA0492GB

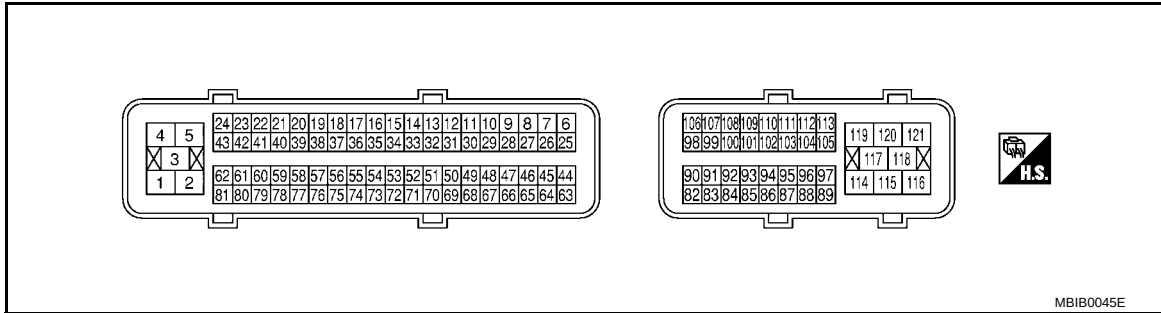
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[VQ TYPE 1]

ECM Harness Connector Terminal Layout

INFOID:000000005448217



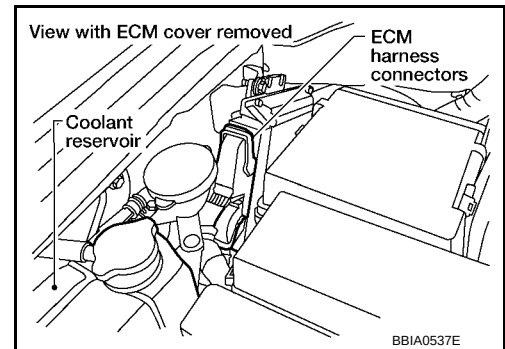
MBIB0045E

ECM Terminal and Reference Value

INFOID:000000005448218

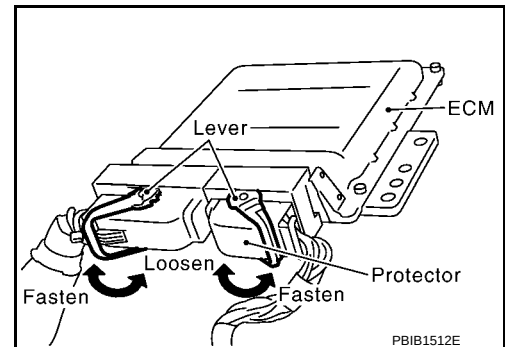
PREPARATION

1. ECM located in the engine room passenger side behind reservoir tank.
2. Remove ECM harness connector.



BBIA0537E

3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
 - Use extreme care not to touch 2 pins at one time.
 - Data is for comparison and may not be exact.



PBIB1512E

ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground.

Pulse signal is measured by CONSULT.

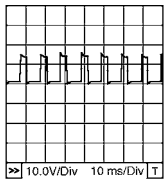
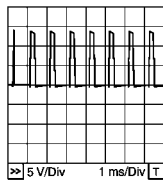
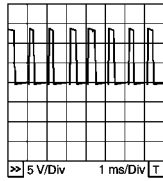
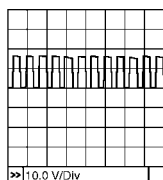
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] • Idle speed	Body ground
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] • Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
10	W	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E

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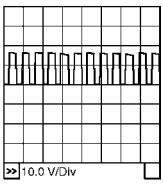
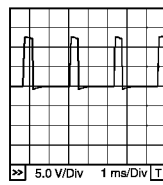
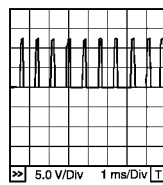
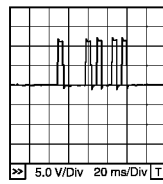
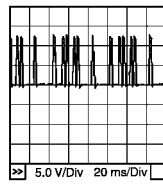
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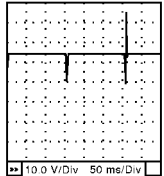
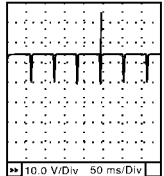
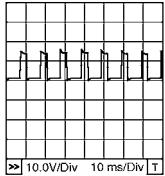
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
12	P	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
13	G	Crankshaft position sensor (POS)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
14	Y	Camshaft position sensor (PHASE) (Bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
15	W	Knock sensor (Bank 1)	[Engine is running] • Idle speed	Approximately 2.5V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

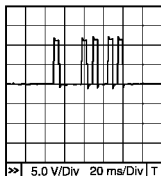
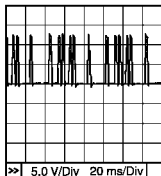
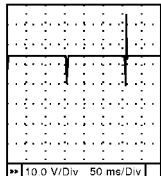
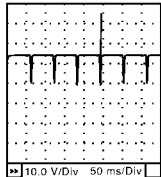
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V	EC
35	O			Approximately 2.6V	
56	LG			Approximately 2.3V	
75	P			Approximately 2.3V	
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★ 	D E F
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 	
		Fuel injector No. 1			
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★ 	I J K
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] • Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V	L M
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)	
29	GR	VIAS control solenoid valve	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)	O
			[Engine is running] • Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V	
32	W	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8V	P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

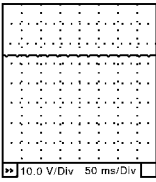
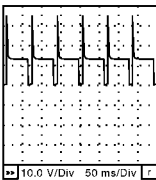
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBI1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBI1040E
34	BR	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
36	W	Knock sensor (Bank 2)	[Engine is running] • Idle speed	Approximately 2.5V
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

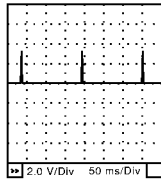
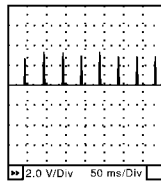
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] - Engine: Stopped - Shift lever: D (A/T), 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine: Stopped - Shift lever: D (A/T), 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
51	P	Mass air flow sensor	[Ignition switch: ON]	Approximately 0.4V
			[Engine is running] - Warm-up condition - Idle speed	0.9 - 1.2V
			[Engine is running] - Warm-up condition - Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] - Warm-up condition - Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

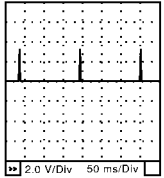
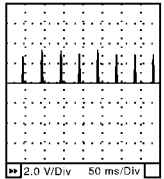
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★ 
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
70	BR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
73	Y	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★ 
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
85	SB	Data link connector	[Ignition switch: ON] • CONSULT or GST: Disconnected	Approximately 5V - Battery voltage (11 - 14V)
86	P	CAN communication line	[Ignition switch: ON]	Approximately 1.1 - 2.3V Output voltage varies with the communication status.
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
94	L	CAN communication line	[Ignition switch: ON]	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
99	SB	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] • Except above position	BATTERY VOLTAGE (11 - 14V)
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	R	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
113	V	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground
117	G	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
121	V	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

CONSULT Function (ENGINE)

INFOID:000000005448219

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. • CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-53, "Emission-related Diagnostic Information"](#).

Freeze Frame Data and 1st Trip Freeze Frame Data

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to EC-24.)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed. - One mode in the following is displayed. "Mode2": Open loop due to detected system malfunction "Mode3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "Mode4": Closed loop - using oxygen sensor(s) as feedback for fuel control "Mode5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed. - The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed. - The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	- Accuracy becomes poor if engine speed drops below the idle rpm. - If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	The signal voltage of the mass air flow sensor is displayed.	When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	- When the engine is stopped, a certain value is indicated. - This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		
COOLAN TEMP/S [°C] or [°F]	×	×	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
A/F SEN1 (B1) [V]	×	×	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
A/F SEN1 (B2) [V]	×			
HO2S2 (B1) [V]	×		• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	×			
HO2S2 MNTR (B1) [RICH/LEAN]	×		• Display of heated oxygen sensor 2 signal: RICH: Means the amount of oxygen after three way catalyst is relatively small. LEAN: Means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT [V]	×	×	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
INT/A TEMP SE [°C] or [°F]	×	×	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL [ON/OFF]	×	×	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	• Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL [ON/OFF]	×	×	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW [ON/OFF]	×		• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
IGN TIMING [BT-DC]		×	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			Calculated load value indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW [g/s]			Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			- Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. - The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			- The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. - The advance angle becomes larger as the value increases.	
INT/V SOL (B2) [%]				
VIAS S/V [ON/OFF]			- The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. - ON: VIAS control solenoid valve is operating. - OFF: VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]		×	- The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. - HI: High speed operation - LOW: Low speed operation - OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]			Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
I/P PULLY SPD [rpm]			Indicates the engine speed computed from the input speed signal.	
VEHICLE SPEED [km/h] or [MPH]			Indicates the vehicle speed computed from the output shaft revolution signal.	
IDL A/V LEARN [YET/CMPLT]			- Display the condition of idle air volume learning - YET: Idle Air Volume Learning has not been performed yet. - CMPLT: Idle Air Volume Learning has already been performed successfully.	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
TRVL AFTER MIL [km] or [mile]			Distance traveled while MIL is activated.	
A/F S1 HTR (B1) [%]			Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals.	
A/F S1 HTR (B2) [%]			The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN [V]			The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW [ON/OFF]			Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1 [ON/OFF]			Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2 [ON/OFF]			Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL [ON/OFF]			Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
CRUISE LAMP [ON/OFF]			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	

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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
Voltage [V]			Voltage, frequency, duty cycle or pulse width measured by the probe.	- Only # is displayed if item is unable to be measured. - Figures with #s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				
HO2 S2 DIAG2 (B1)*			- Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B2)*			- Indicates DTC P0159 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B1)*			- Indicates DTC P0133 self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B2)*			- Indicates DTC P0153 self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	

*: The item is indicated, but not used.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
ENG SPEED [rpm]	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	The signal voltage of the mass air flow sensor specification is displayed.	When engine is running specification range is indicated.
B/FUEL SCHDL [msec]		×	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated.
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	- When engine is running specification range is indicated. - This data also includes the data for the air-fuel ratio learning control.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	- Engine: Return to the original trouble condition - Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel injector - Air fuel ratio (A/F) sensor 1
IGNITION TIMING	- Engine: Return to the original trouble condition - Timing light: Set - Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	- Engine: After warming up, idle the engine. - A/C switch: OFF - Shift lever: P or N (A/T), Neutral (M/T) - Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or dies.	- Harness and connectors - Compression - Fuel injector - Power transistor - Spark plug - Ignition coil
COOLING FAN*	- Ignition switch: ON - Turn the cooling fan HI, LOW and OFF using CONSULT.	Cooling fan moves and stops.	- Harness and connectors - Cooling fan motor - IPDM E/R
ENG COOLANT TEMP	- Engine: Return to the original trouble condition - Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector
FUEL PUMP RELAY	- Ignition switch: ON (Engine stopped) - Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	- Harness and connectors - Fuel pump relay
VIAS SOL VALVE	- Ignition switch: ON - Turn solenoid valve ON and OFF with CONSULT and listen for operating sound.	Solenoid valve makes an operating sound.	- Harness and connectors - Solenoid valve
PURG VOL CONT/V	- Engine: After warming up, run engine at 1,500 rpm. - Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	- Harness and connectors - Solenoid valve
V/T ASSIGN ANGLE	- Engine: Return to the original trouble condition - Change intake valve timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to [EC-53, "Emission-related Diagnostic Information"](#).

SRT Work Support Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Test mode	Test item	Condition	Reference page
A/F SEN1	A/F SEN1 (B1) P1276	Refer to corresponding trouble diagnosis for DTC.	EC-385
	A/F SEN1 (B1) P1278/P1279		EC-393 , EC-402
	A/F SEN1 (B2) P1286		EC-385
	A/F SEN1 (B2) P1288/P1289		EC-393 , EC-402
HO2S2	HO2S2 (B1) P0139		EC-194
	HO2S2 (B1) P1146		EC-311
	HO2S2 (B1) P1147		EC-321
	HO2S2 (B2) P0159		EC-194
	HO2S2 (B2) P1166		EC-311
	HO2S2 (B2) P1167		EC-321

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

- “AUTO TRIG” (Automatic trigger):
 - The malfunction will be identified on the CONSULT screen in real time.
In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT OPERATION MANUAL.
- “MANU TRIG” (Manual trigger):
 - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

Operation

- “AUTO TRIG”
 - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
 - While narrowing down the possible causes, CONSULT should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “INCIDENT SIMULATION TESTS” in [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident".](#))
- “MANU TRIG”
 - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

Generic Scan Tool (GST) Function

INFOID:000000005448220

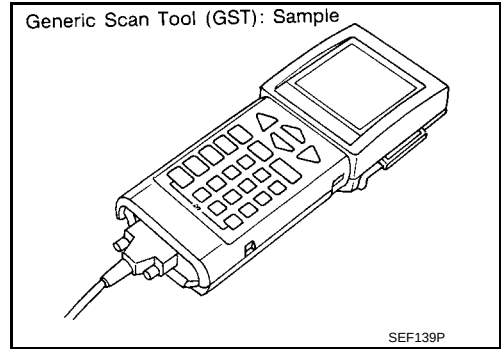
DESCRIPTION

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name GST or Generic Scan Tool is used in this service manual.



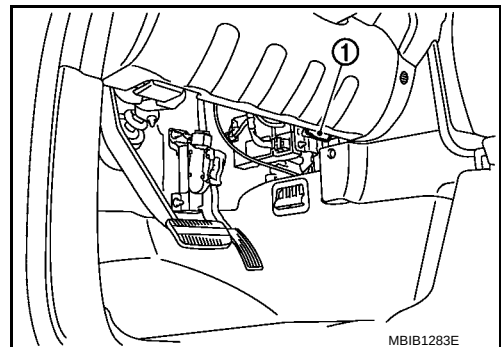
FUNCTION

Diagnostic test mode		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-117, "CONSULT Function (ENGINE)" .
Service \$03	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$06 and Service \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related power train components/systems that are continuously monitored during normal driving conditions.
Service \$08	—	This diagnostic service is not applicable on this vehicle.
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.
Service \$0A*	PERMANENT DTCs	This diagnostic service gains access to permanent DTCs which were stored by ECM.

*: Service \$0A is not applied for regions where it is not mandated.

INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect GST to data link connector (1), which is located under LH dash panel near the hood opener handle.

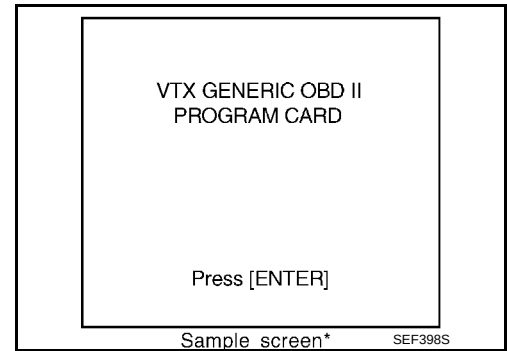


TROUBLE DIAGNOSIS

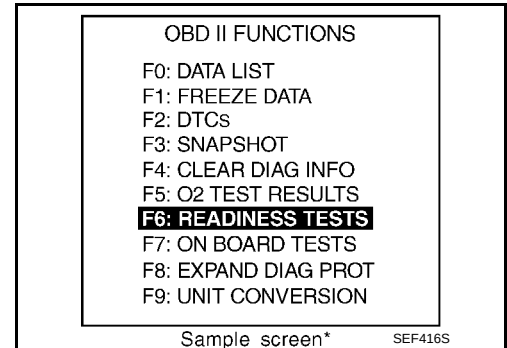
< SERVICE INFORMATION >

[VQ TYPE 1]

3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448221

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- * Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-132 .		
B/FUEL SCHDL	See EC-132 .		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-132 .		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1) HO2S2 (B2)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ↔ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned.	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd	ON
		Rear window defogger switch and lighting switch is OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	13 - 18° BTDC
		2,000 rpm	25 - 45° BTDC
CAL/LD VALUE	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	5 - 35%
		2,500 rpm	5 - 35%
MASS AIRFLOW	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 6.0 g/s
		2,500 rpm	7.0 - 20.0 g/s
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	-5 - 5°C
		2,000 rpm	Approx. 0 - 30°C

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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0% - 2%
		2,000 rpm	Approx. 0 - 50%
VIAS S/V	Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	- For 1 second after turning ignition switch ON - Engine running or cranking		ON
	Except above conditions		OFF
THRTL RELAY	Ignition switch: ON		ON
COOLING FAN	- Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed is below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the speedometer indication
VEHICLE SPEED	Turn drive wheels and compare the CONSULT value with speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1) A/F S1 HTR (B2)	Engine: After warming up, idle the engine		0 - 100%
AC PRESS SEN	- Engine: Idle - Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	Turn drive wheels and compare speedometer indication with the CONSULT value.		Almost the same speed as the CONSULT value
SET VHCL SPD	Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	• Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	• Ignition switch: ON	MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40km/h (25MPH) and 175km/h (109MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
HO2 S2 DIAG2 (B1)	This item is displayed but is not applicable to this model.		
HO2 S2 DIAG2 (B2)	This item is displayed but is not applicable to this model.		
A/F SEN1 DIAG2 (B1)	This item is displayed but is not applicable to this model.		
A/F SEN1 DIAG2 (B2)	This item is displayed but is not applicable to this model.		

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

Major Sensor Reference Graph in Data Monitor Mode

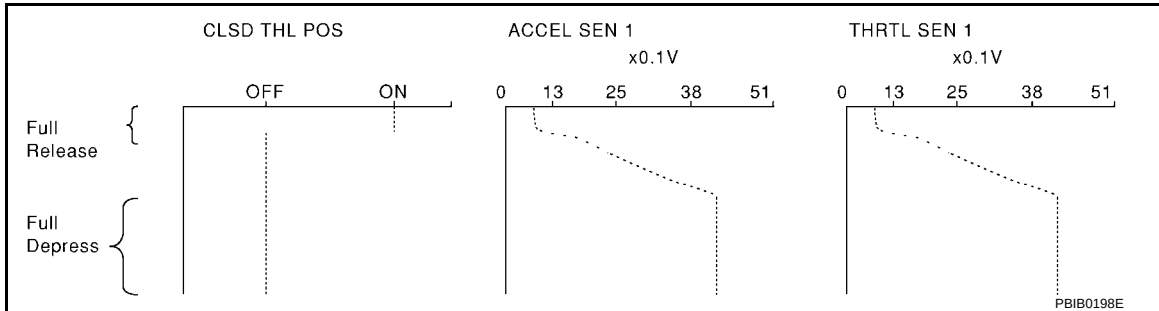
INFOID:000000005448222

The following are the major sensor reference graphs in "DATA MONITOR" mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

Below is the data for "CLSD THL POS", "ACCEL SEN 1" and "THRTL SEN 1" when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T), 1st position (M/T).

The signal of "ACCEL SEN 1" and "THRTL SEN 1" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from ON to OFF.



ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

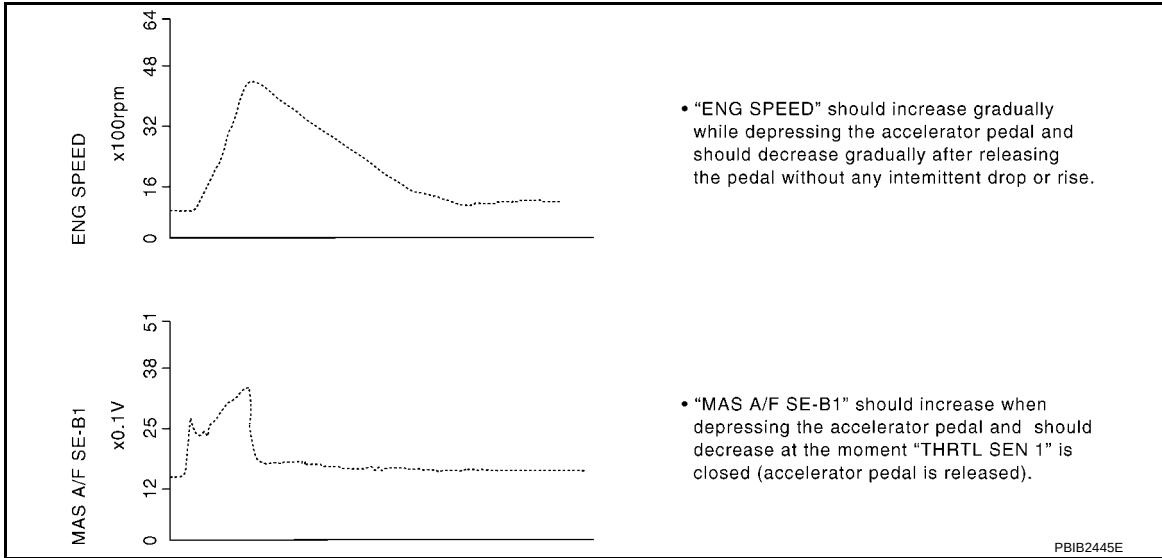
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL SEN 1", "HO2S2 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

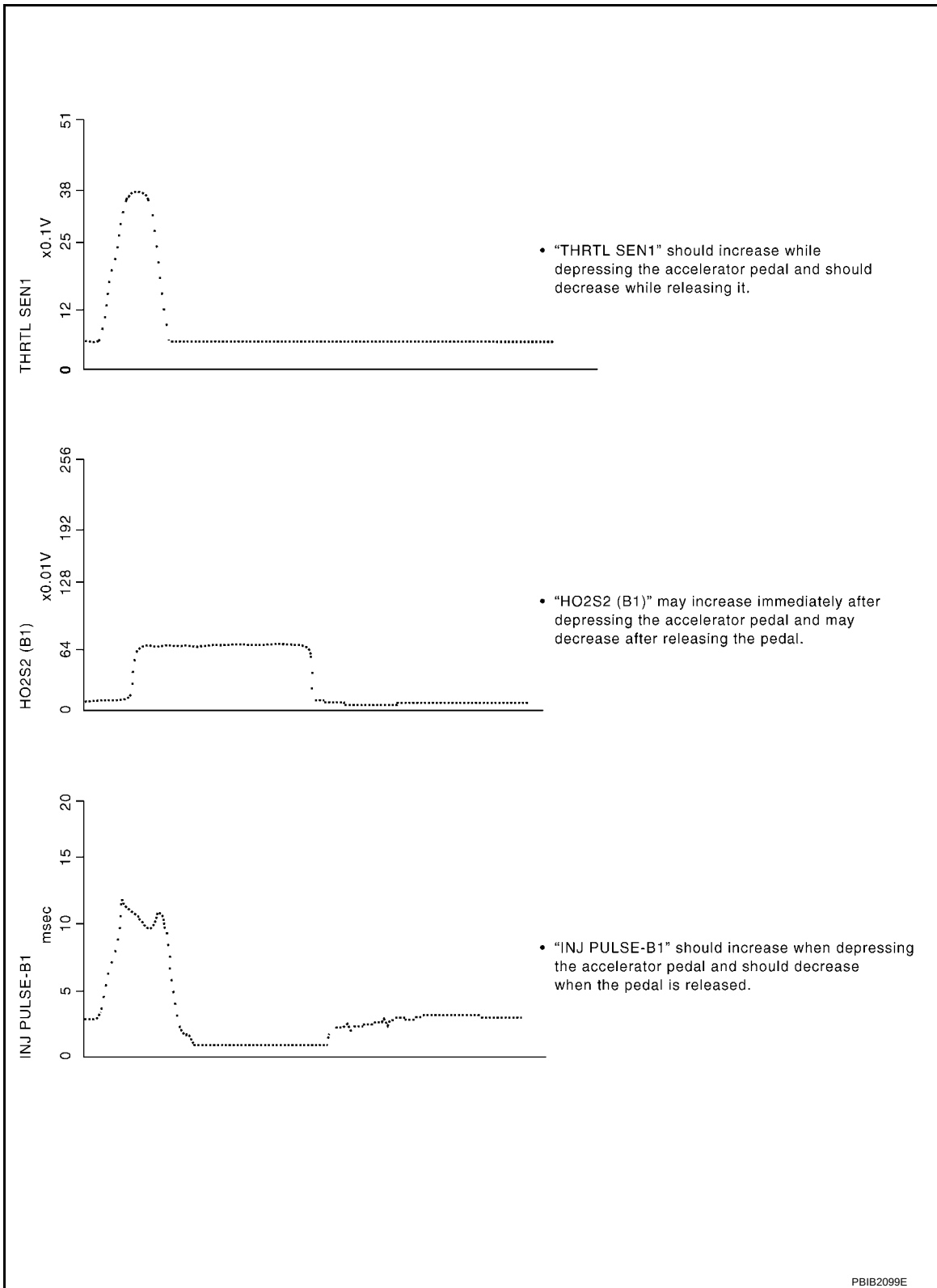
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 1]

Each value is for reference, the exact value may vary.





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TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000005448223

The specification (SP) value indicates the tolerance of the value that is displayed in "DATA MONITOR (SPEC)" mode of CONSULT during normal operation of the Engine Control System. When the value in "DATA MONITOR (SPEC)" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "DATA MONITOR (SPEC)" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

INFOID:000000005448224

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm², 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
- A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

INFOID:000000005448225

NOTE:

Perform "DATA MONITOR (SPEC)" mode in maximum scale display.

1. Perform [EC-76, "Basic Inspection"](#).
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2" and "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode with CONSULT.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-132, "Diagnosis Procedure"](#).

Diagnosis Procedure

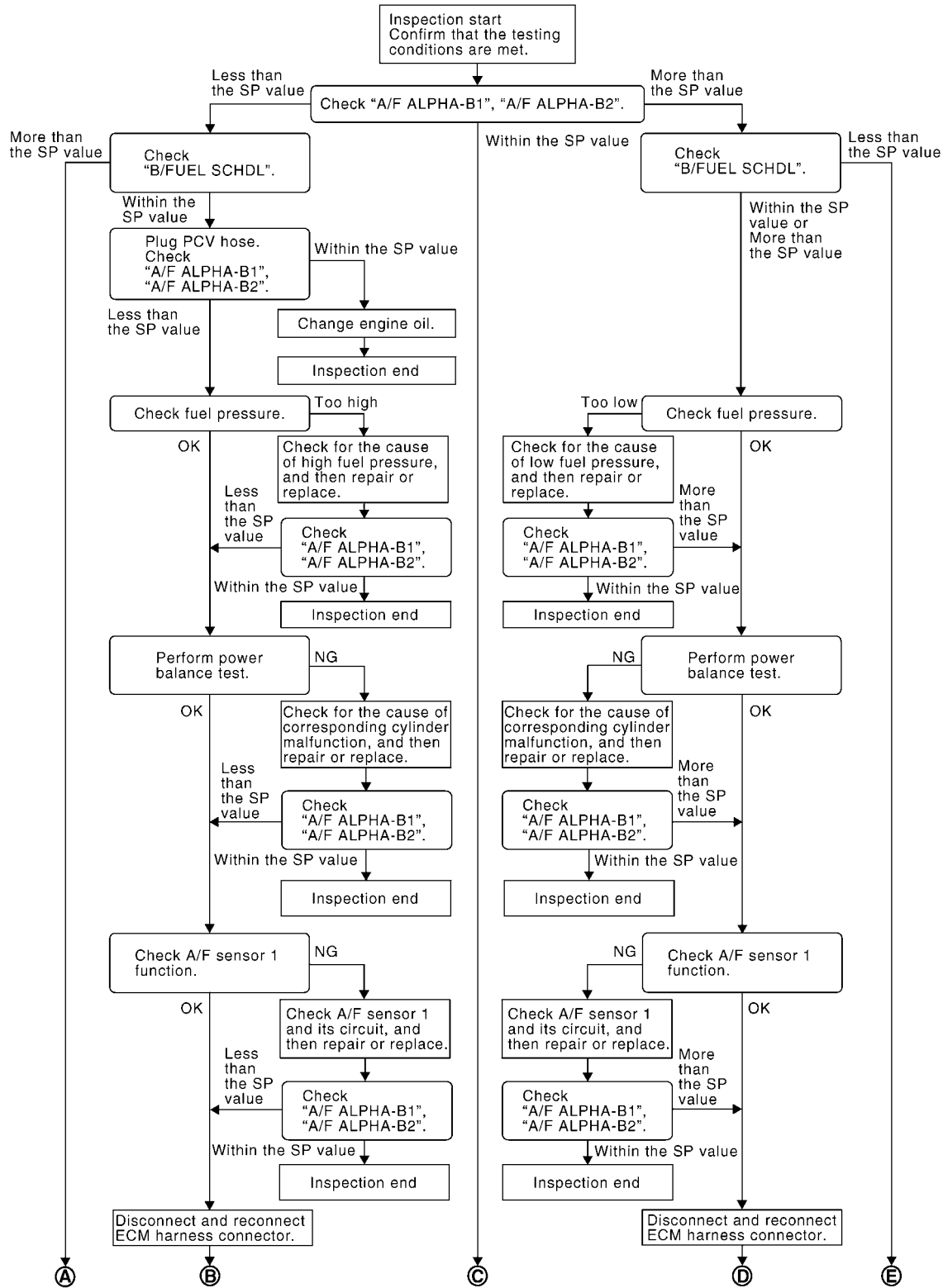
INFOID:000000005448226

OVERALL SEQUENCE

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 1]



PBIB2268E

[VQ TYPE 1]



1.CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

- NOTE:**

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 1]

< SERVICE INFORMATION >

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

- OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> GO TO 4.
NG (More than the SP value)>>GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

- OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-84. "Fuel Pressure Check"](#).)

OK or NG

- OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to [EC-84](#). GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7.DETECT MALFUNCTIONING PART

1. Check the following.
 - Clogged and bent fuel hose and fuel tube
 - Clogged fuel filter
 - Fuel pump and its circuit (Refer to [EC-494](#).)
2. If NG, repair or replace the malfunctioning part. (Refer to [EC-84](#).)
If OK, replace fuel pressure regulator.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 1]

< SERVICE INFORMATION >

>> GO TO 8.

8.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.

NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

1. Check the following.
 - Ignition coil and its circuit (Refer to [EC-499](#).)
 - Fuel injector and its circuit (Refer to [EC-488](#).)
 - Intake air leakage
 - Low compression pressure (Refer to [EM-88, "On-Vehicle Service"](#).)
2. If NG, repair or replace the malfunctioning part.
If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P1271, P1281, refer to [EC-351, "DTC Confirmation Procedure"](#).
- For DTC P1272, P1282, refer to [EC-359, "DTC Confirmation Procedure"](#).
- For DTC P1273, P1283, refer to [EC-367, "DTC Confirmation Procedure"](#).
- For DTC P1274, P1284, refer to [EC-376, "DTC Confirmation Procedure"](#).
- For DTC P1276, P1286, refer to [EC-385, "DTC Confirmation Procedure"](#).
- For DTC P1278, P1288, refer to [EC-393, "DTC Confirmation Procedure"](#).
- For DTC P1279, P1289, refer to [EC-402, "DTC Confirmation Procedure"](#).

OK or NG

OK >> GO TO 15.

NG >> GO TO 13.

13.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 1]

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 15.

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-93. "Symptom Matrix Chart"](#).

17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (More than the SP value)>>GO TO 18.

NG (Less than the SP value)>>GO TO 25.

18.DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
 - Engine oil level is too high
 - Engine oil viscosity
 - Belt tension of power steering, alternator, A/C compressor, etc. is excessive
 - Noise from engine
 - Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
 - Valve clearance malfunction
 - Intake valve timing control function malfunction
 - Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.

NG >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG ("B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value)>>GO TO 21.

21.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC-163](#).
2. GO TO 29.

NG >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
3. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-82, "Idle Air Volume Learning"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (Less than the SP value)>>GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 1]

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-93. "Symptom Matrix Chart"](#).

30. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-93. "Symptom Matrix Chart"](#).

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

[VQ TYPE 1]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000005448227

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:000000005448228

1.INSPECTION START

Erase (1st trip) DTCs. Refer to [EC-53, "Emission-related Diagnostic Information"](#).

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-147, "Ground Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

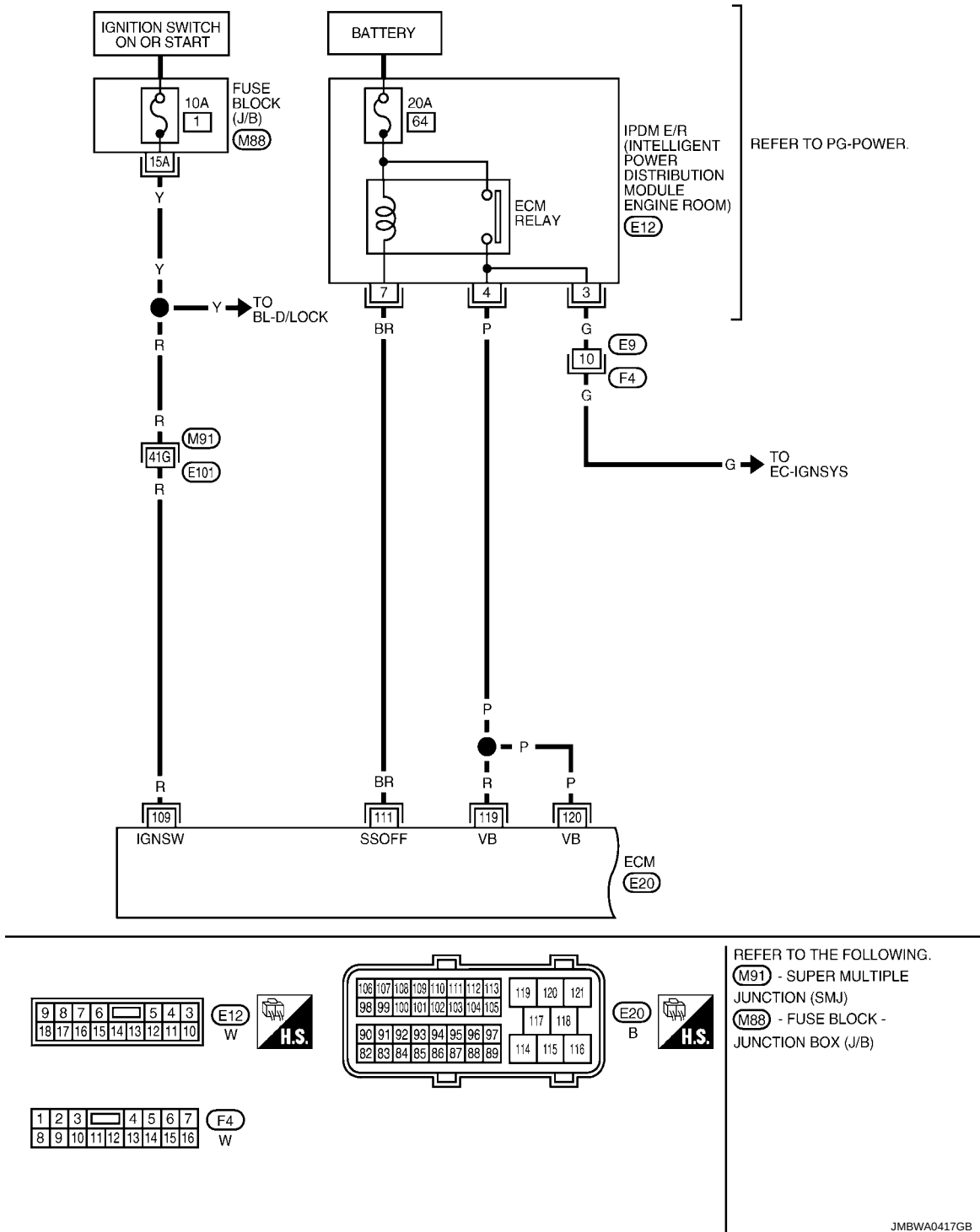
POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:000000005448229

EC-MAIN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	R	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning igni- tion switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

[VQ TYPE 1]

EC-MAIN-02

A

C

D

E

F

G

H

1

J

K

L

M

N

O

P



EC-143

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] • Idle speed	Body ground
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground

Diagnosis Procedure

INFOID:000000005448230

1.INSPECTION START

Start engine.

Is engine running?

Yes or No

Yes >> GO TO 8.

No >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

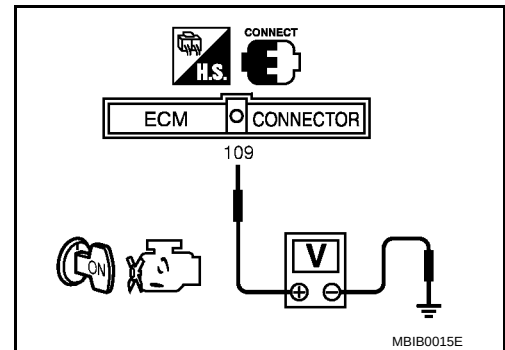
1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

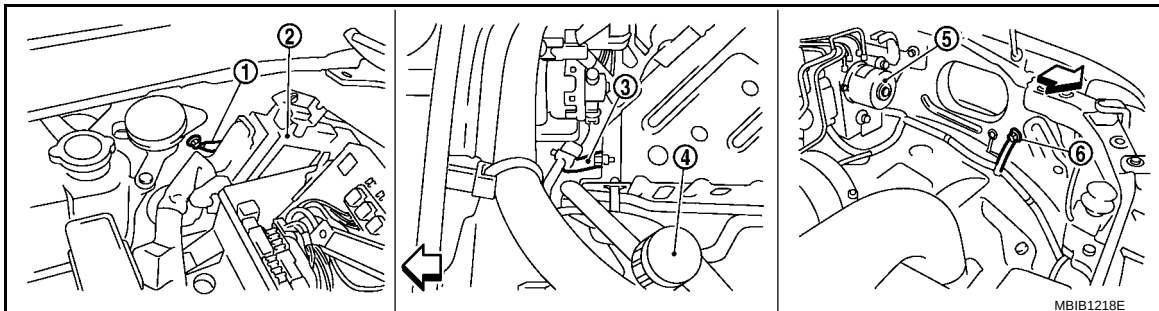
Check the following.

- Harness connectors M91, E101
- Fuse block (J/B) connector M88
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace ground connections.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

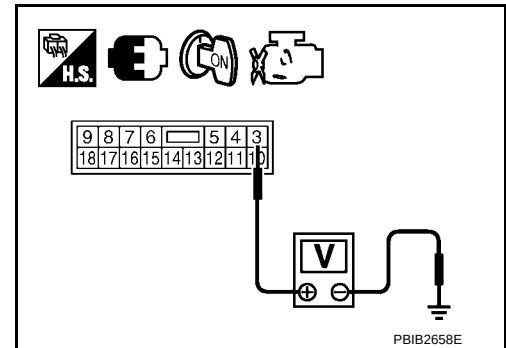
7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R connector E12 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> Go to [EC-499](#).
NG >> GO TO 8.



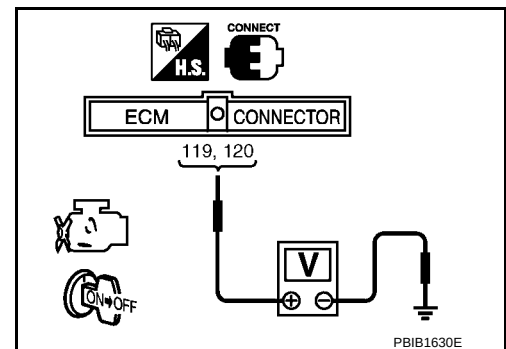
8.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

OK or NG

- OK >> GO TO 13.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.



POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

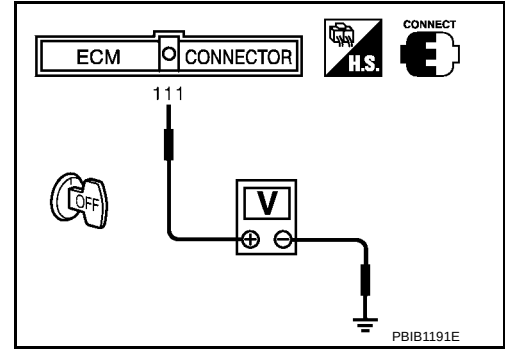
9. CHECK ECM POWER SUPPLY CIRCUIT-IV

Check voltage between ECM terminal 111 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 11.



10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 16.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 7. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 12.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

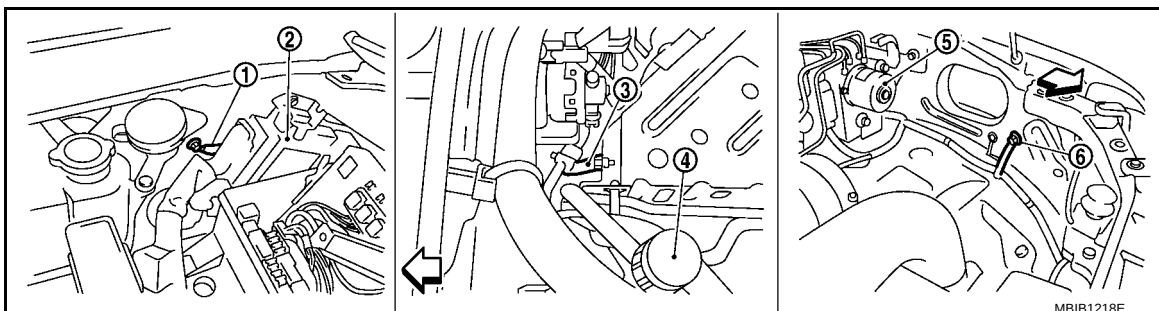
1. Disconnect 20 A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

- OK >> GO TO 16.
- NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 14.
NG >> Repair or replace ground connections.

14.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between ECM terminals 1, 115, 116 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

- OK >> GO TO 16.
NG >> GO TO 15.

15.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

16.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> Replace IPDM E/R.
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

INFOID:000000005448231

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

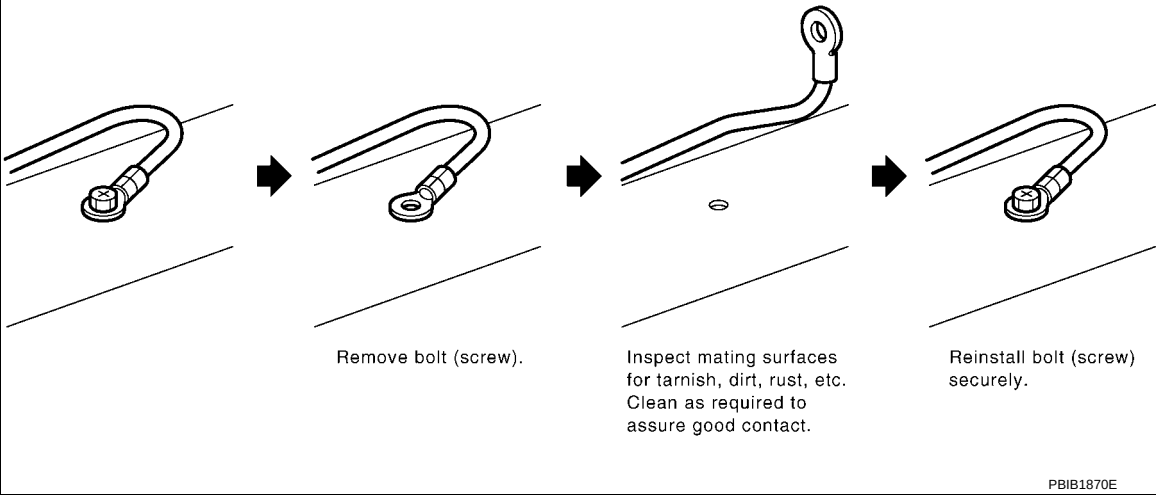
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 1]

For detailed ground distribution information, refer to [PG-36. "Ground Distribution"](#).

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC U1000, U1001 CAN COMMUNICATION LINE

Description

INFOID:000000005448232

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005448233

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)
U1001*2 1001*2		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	

*1: This self-diagnosis has the one trip detection logic.

*2: The MIL will not light up for this diagnosis.

DTC Confirmation Procedure

INFOID:000000005448234

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-150, "Diagnosis Procedure"](#).

DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

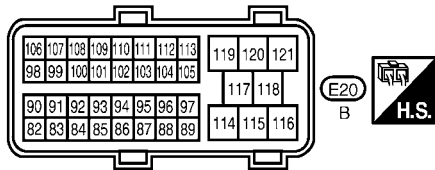
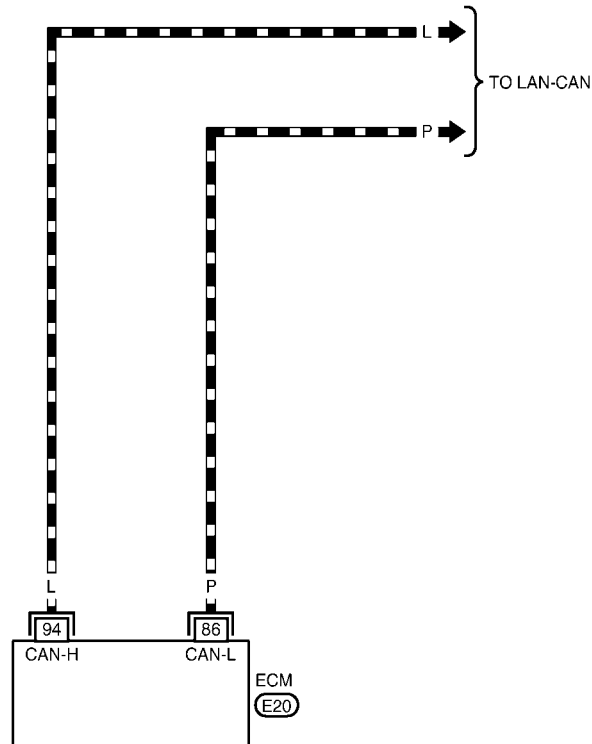
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448235

EC-CAN-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- : DATA LINE



MBWA1276E

Diagnosis Procedure

INFOID:000000005448236

Go to [LAN-46, "CAN System Specification Chart"](#).

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0011, P0021 IVT CONTROL

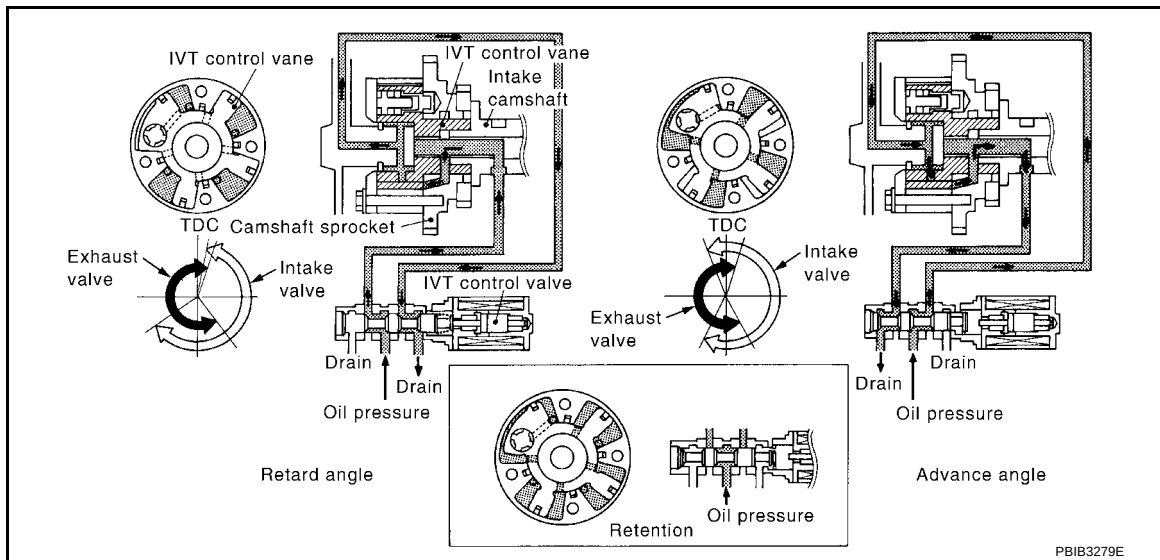
Description

INFOID:000000005448237

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448238

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load Idle	-5 - 5°C
	2,000 rpm	Approx. 0 - 30°C
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load Idle	0 - 2%
	2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

INFOID:000000005448239

The MIL will not light up for this diagnosis.

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011 (Bank 1)	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control
P0021 0021 (Bank 2)			

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function.

DTC Confirmation Procedure

INFOID:000000005448240

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to [EC-287](#).
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

3. Stop vehicle with engine running and let engine idle for 10 seconds.
4. Check 1st trip DTC.
5. If the 1st trip DTC is detected, go to [EC-153, "Diagnosis Procedure"](#).
If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. Check 1st trip DTC.
8. If the 1st trip DTC is detected, go to [EC-153, "Diagnosis Procedure"](#).

WITH GST

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 1]

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

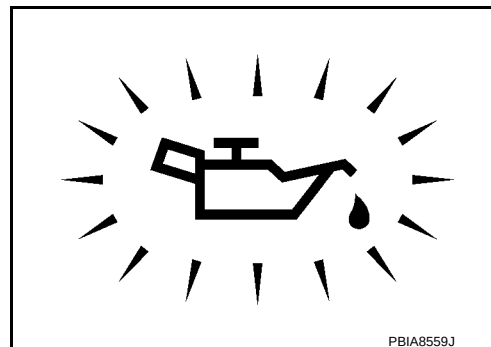
INFOID:000000005448241

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

OK or NG

- OK >> GO TO 2.
KG >> Go to [LU-6, "Inspection"](#).



2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-154, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-246, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-255, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace camshaft position sensor (PHASE).

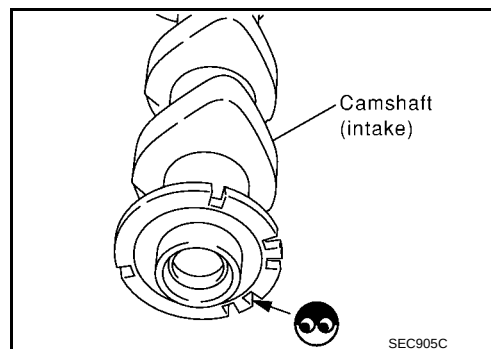
5.CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

- OK >> GO TO 6.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

Yes or No

- Yes >> Check timing chain installation. Refer to [EM-53](#).
No >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

DTC P0011, P0021 IVT CONTROL

[VQ TYPE 1]

< SERVICE INFORMATION >

Refer to [EM-72](#), "Removal and Installation".

OK or NG

OK >> GO TO 8.

NG >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

For Wiring Diagram, refer to [EC-243](#) for CKP sensor (POS) and [EC-250](#) for CMP sensor (PHASE).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448242

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.

If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

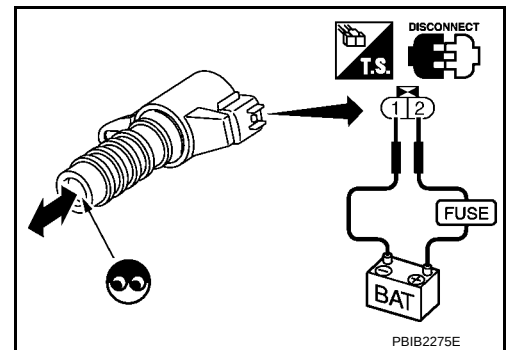
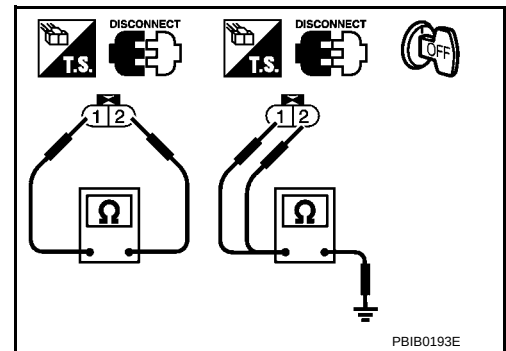
CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:000000005448243

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

Description

INFOID:000000005448244

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448245

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed is below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

INFOID:000000005448246

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037 (Bank 1) P0057 0057 (Bank 2)	Heated oxygen sensor 2 heater control circuit low input	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	- Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) - Heater oxygen sensor 2 heater
P0038 0038 (Bank 1) P0058 0058 (Bank 2)	Heated oxygen sensor 2 heater control circuit high input	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	- Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) - Heater oxygen sensor 2 heater

DTC Confirmation Procedure

INFOID:000000005448247

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VQ TYPE 1]

< SERVICE INFORMATION >

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start the engine and keep the engine speed between 3,500 rpm and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-160, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

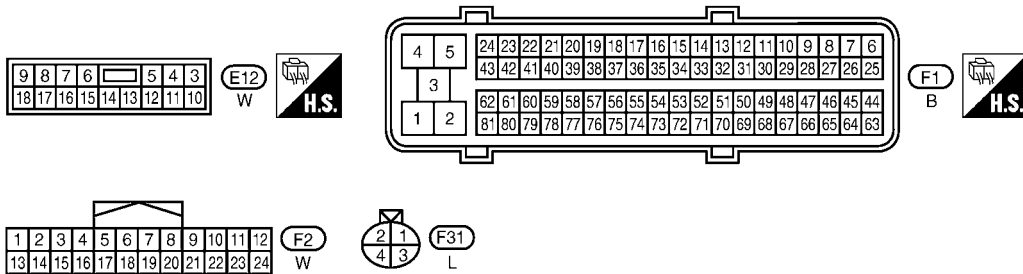
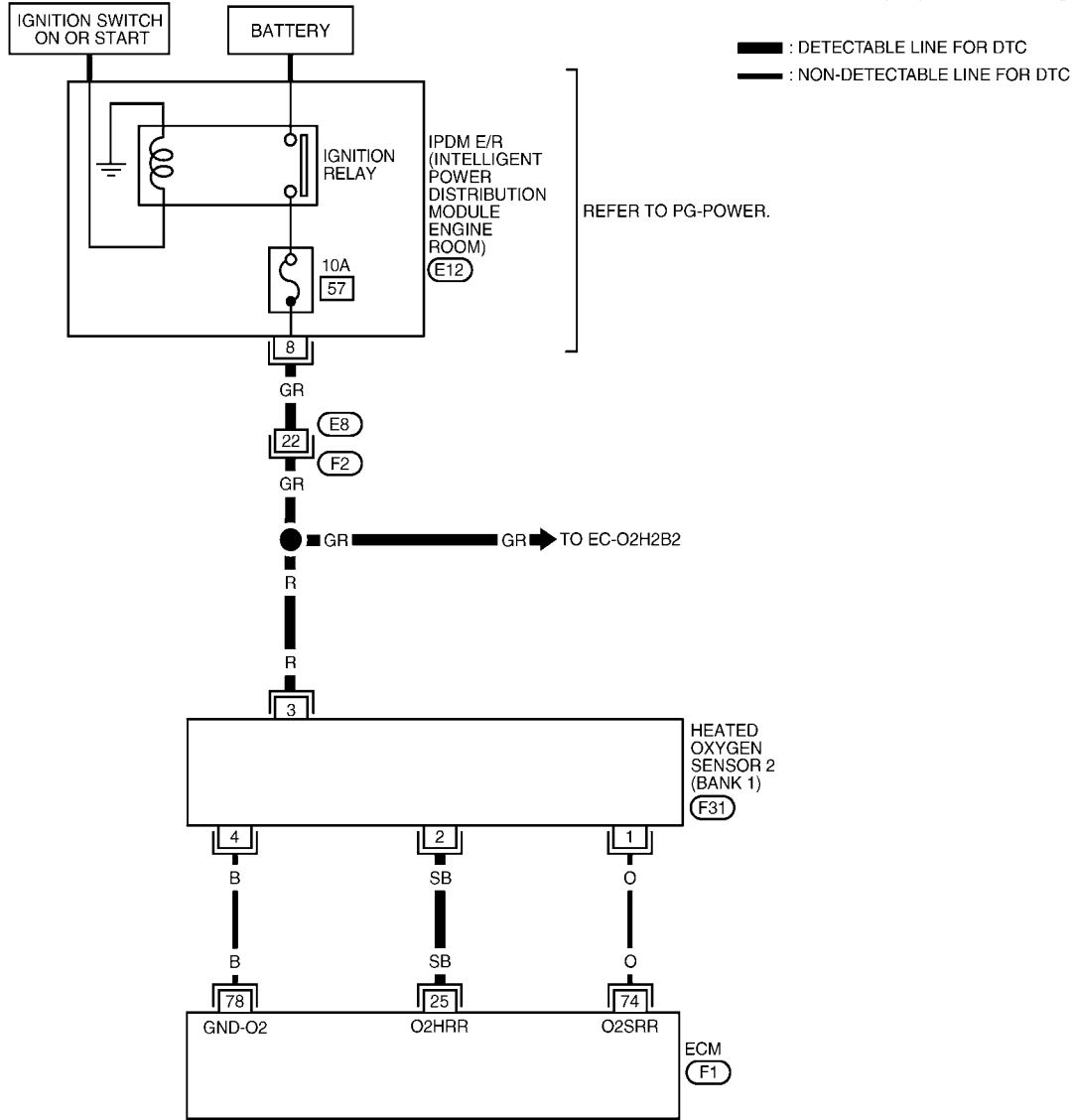
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448248

BANK 1

EC-O2H2B1-01



JMBWA1209GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VQ TYPE 1]

< SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

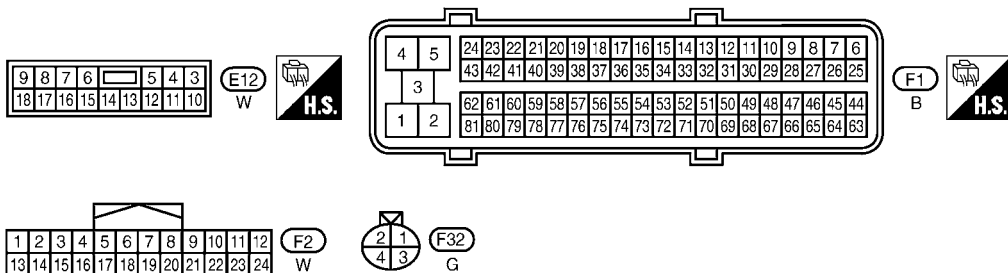
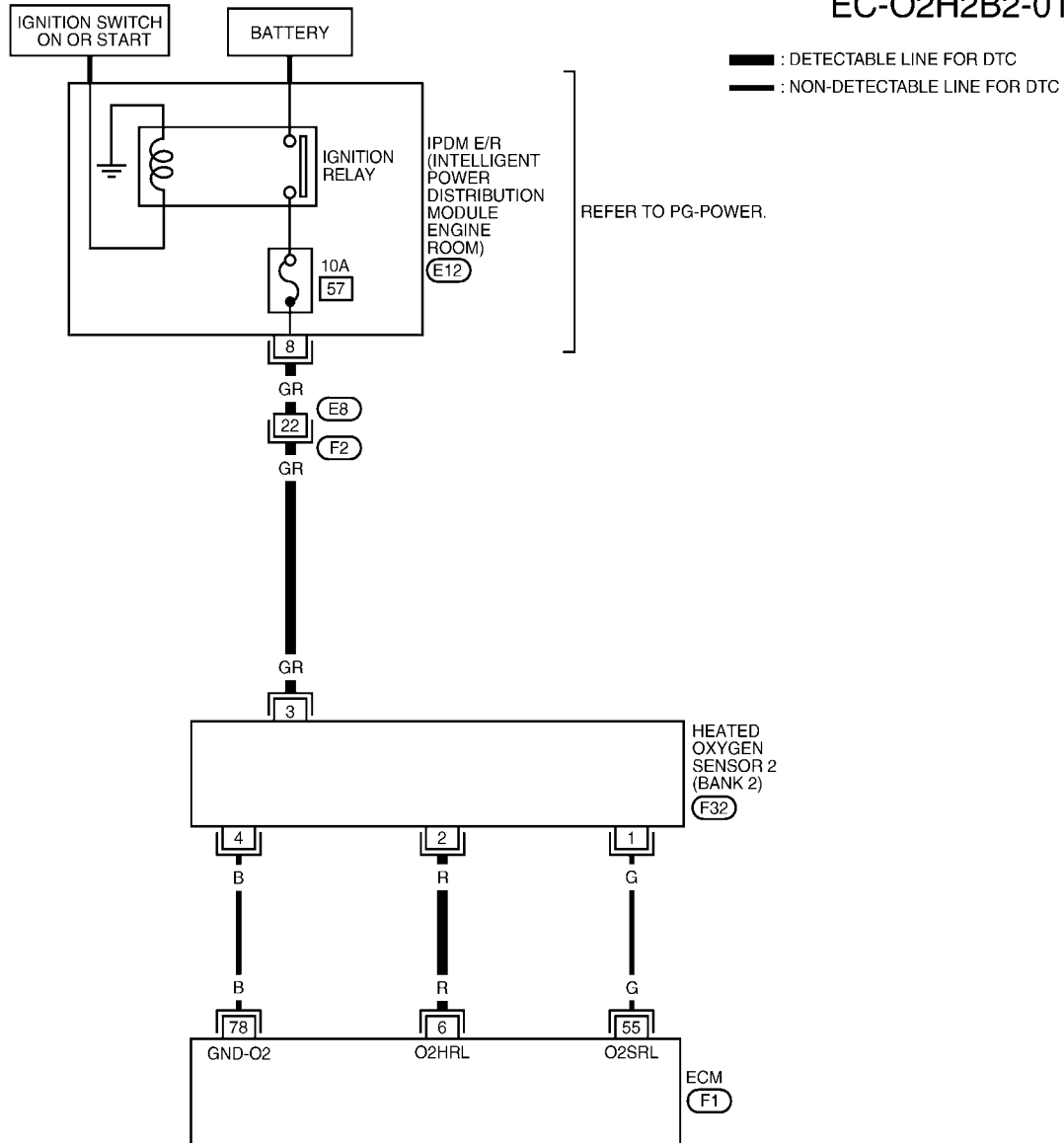
DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-O2H2B2-01



JMBWA1210GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

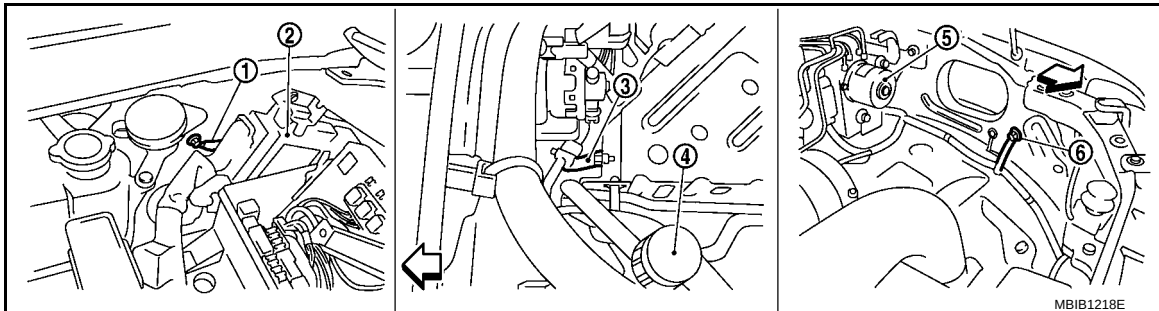
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met. - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448249

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↖ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

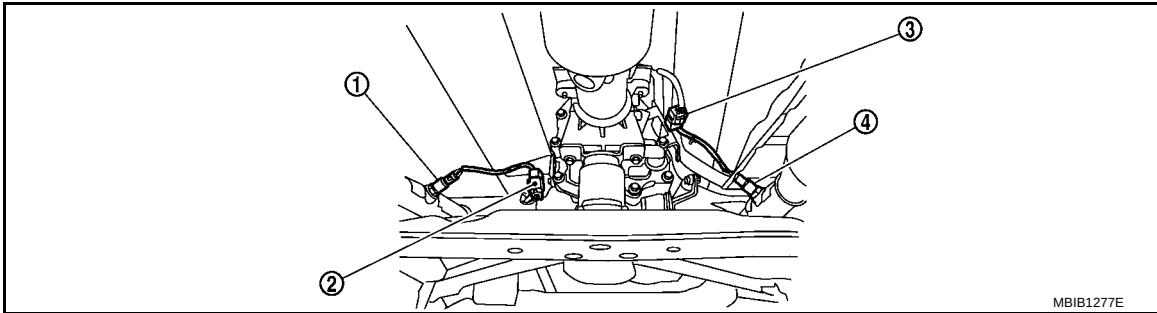
2.CHECK HO2S2 POWER SUPPLY CIRCUIT

- Disconnect heated oxygen sensor 2 harness connector.

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]



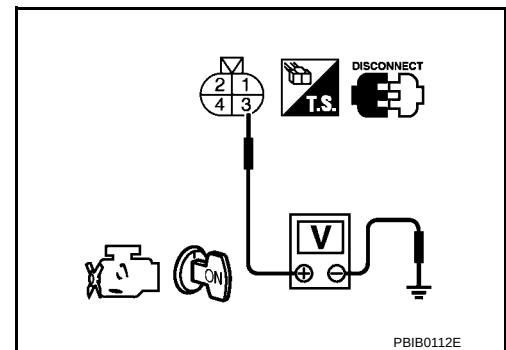
1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	25	2	1
P0057, P0058	6	2	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-162. "Component Inspection"](#).

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

OK or NG

- OK >> GO TO 6.
- NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448250

HEATED OXYGEN SENSOR 2 HEATER

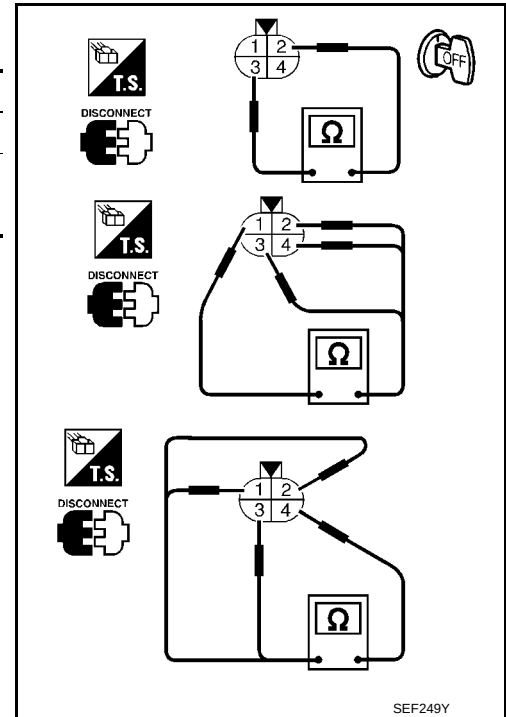
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	9.9 - 13.3 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$
4 and 1, 2, 3	(Continuity should not exist)

2. If NG, replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.



INFOID:000000005448251

Removal and Installation

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

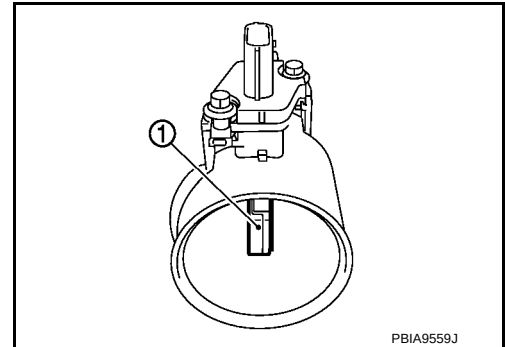
DTC P0102, P0103 MAF SENSOR

Component Description

INFOID:000000005448252

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448253

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-132 .		
CAL/LD VALUE	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	5 - 35%
		2,500 rpm	5 - 35%
MASS AIRFLOW	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 6.0 g/s
		2,500 rpm	7.0 - 20.0 g/s

On Board Diagnosis Logic

INFOID:000000005448254

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted.) - Intake air leaks - Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted.) - Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

INFOID:000000005448255

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

< SERVICE INFORMATION >

 With CONSULT

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-166, "Diagnosis Procedure"](#).

 With GST

Follow the procedure "With CONSULT" above.

PROCEDURE FOR DTC P0103 With CONSULT

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-166, "Diagnosis Procedure"](#).
If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. Check DTC.
7. If DTC is detected, go to [EC-166, "Diagnosis Procedure"](#).

 With GST

Follow the procedure "With CONSULT" above.

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

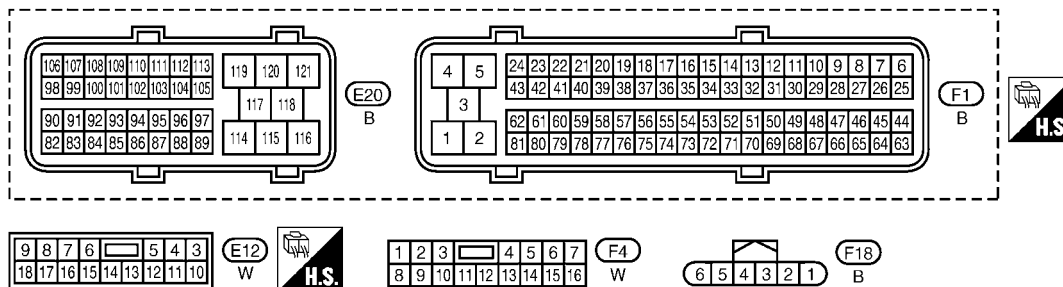
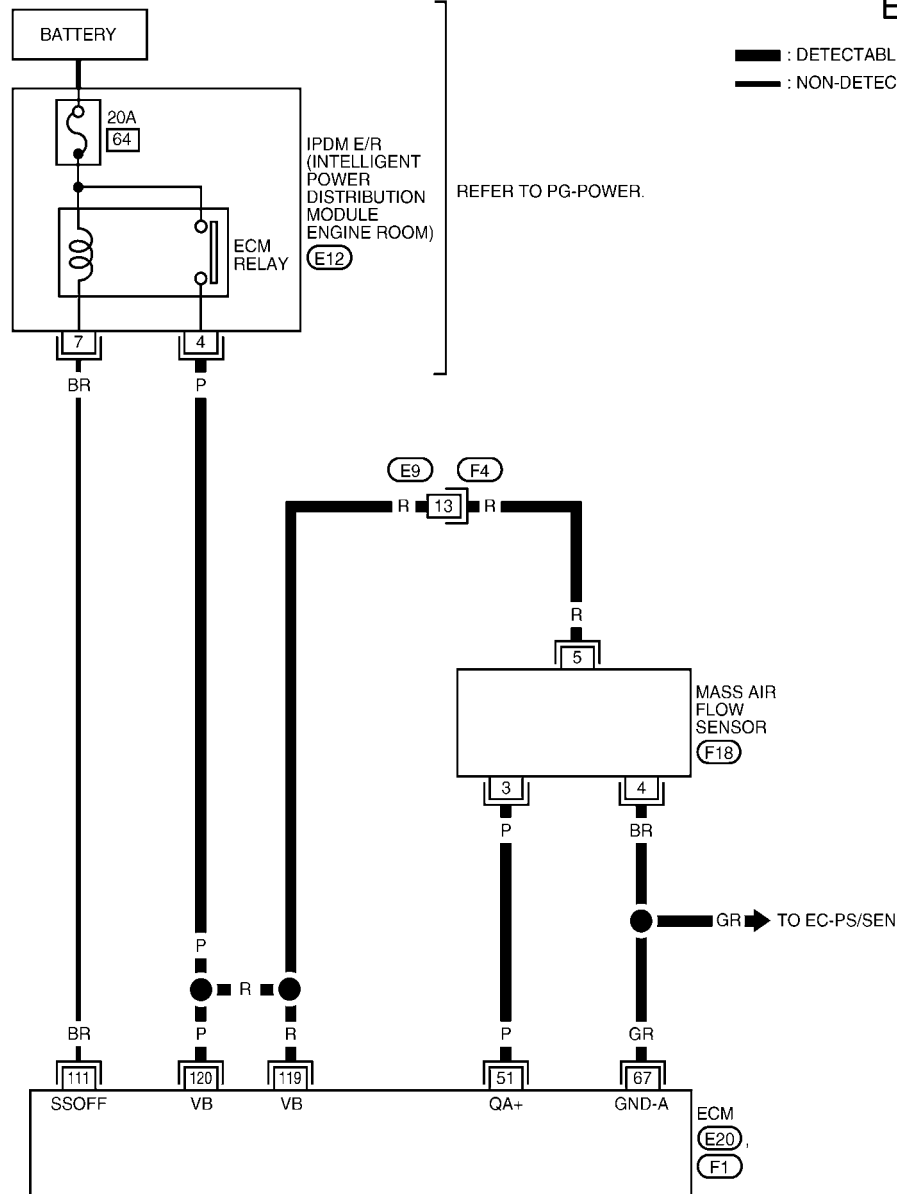
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448256

EC-MAFS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0420GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	P	Mass air flow sensor	[Ignition switch: ON]	Approximately 0.4V
			[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2V
			[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448257

1.INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

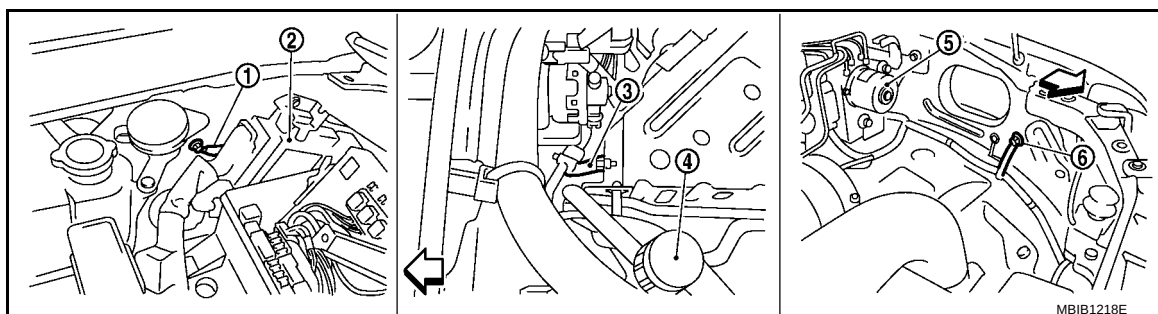
OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

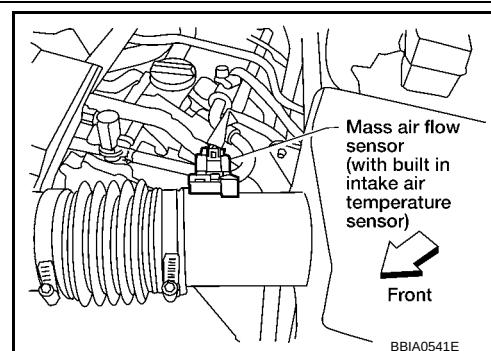
OK or NG

OK >> GO TO 4.

NG >> Repair or replace ground connections.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



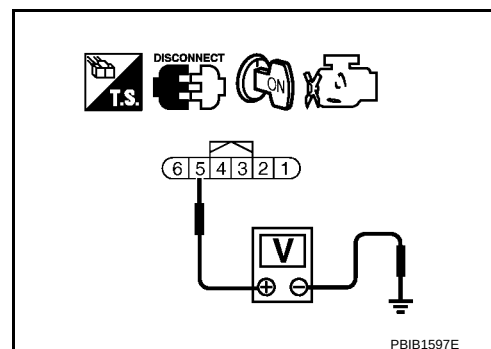
3. Check voltage between MAF sensor terminal 5 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 4 and ECM terminal 67.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 3 and ECM terminal 51.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-168, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448258

MASS AIR FLOW SENSOR

 With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
 - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

 Without CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

DTC P0102, P0103 MAF SENSOR

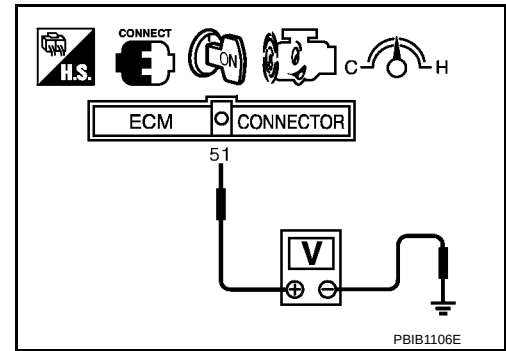
[VQ TYPE 1]

< SERVICE INFORMATION >

3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.
- Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - If NG, repair or replace malfunctioning part and perform step 2 to 3 again. If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:000000005448259

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

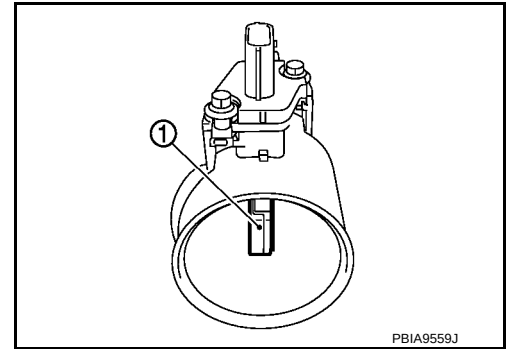
DTC P0112, P0113 IAT SENSOR

Component Description

INFOID:000000005448260

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



PBIA9559J

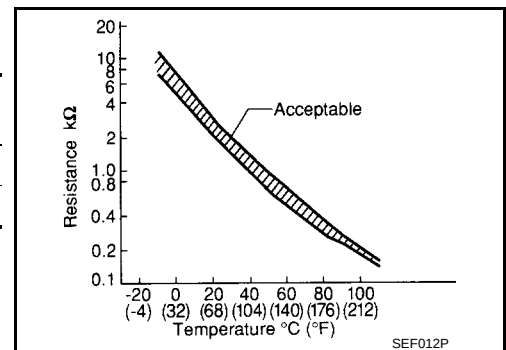
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



SEF012P

On Board Diagnosis Logic

INFOID:000000005448261

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000005448262

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-171. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

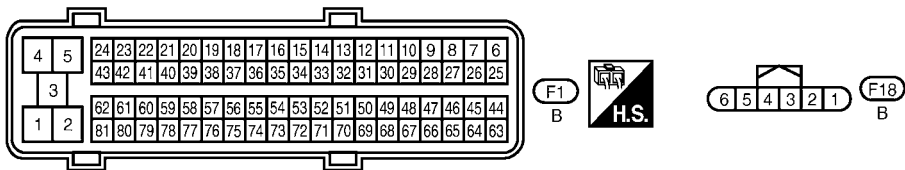
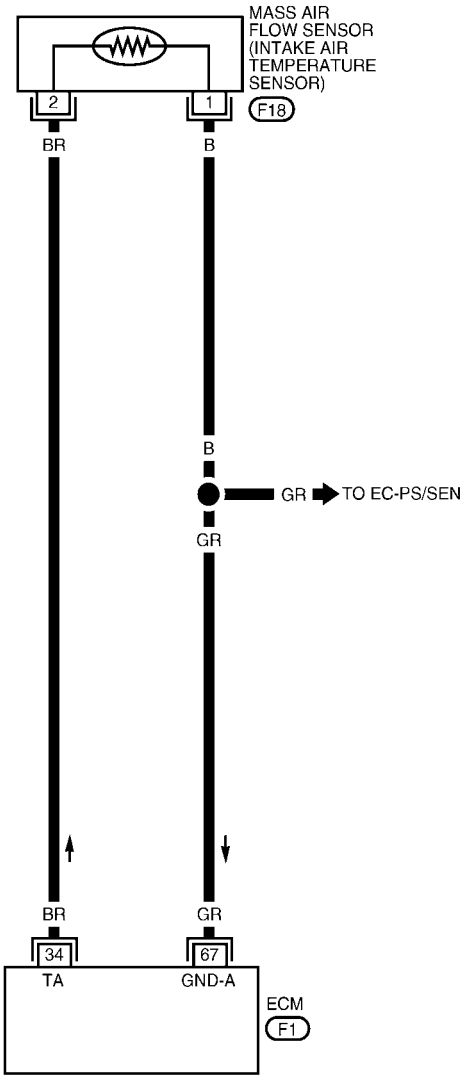
Wiring Diagram

INFOID:000000005448263

EC-IATS-01

EC

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Diagnosis Procedure

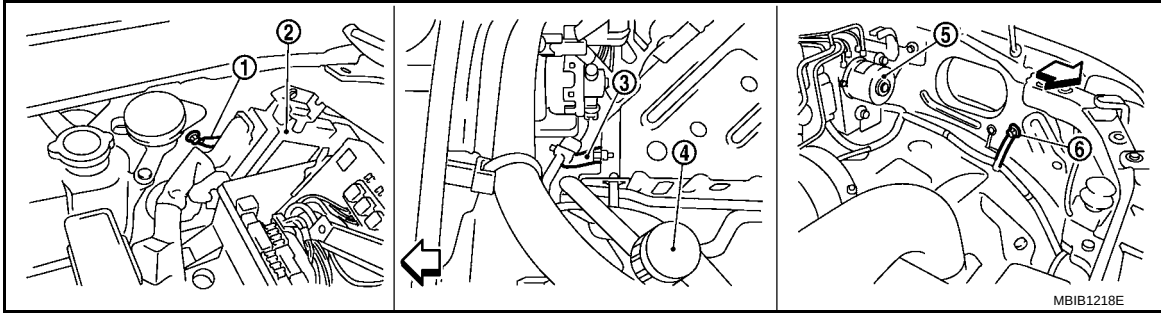
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]



↖ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

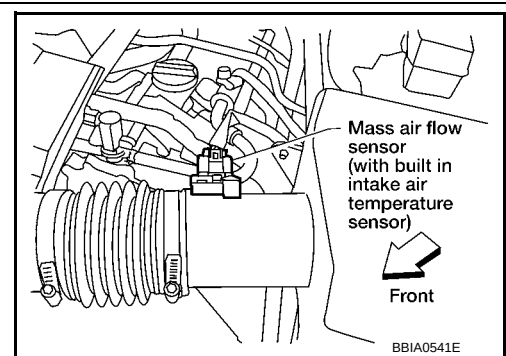
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.



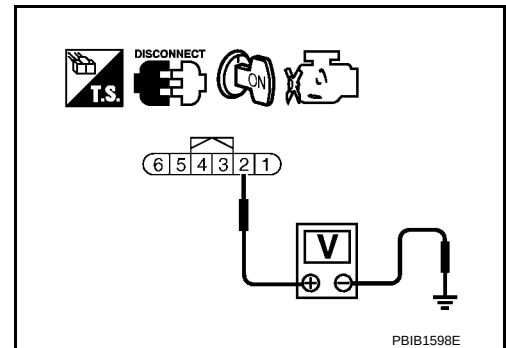
3. Check voltage between mass air flow sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.

NG >> Repair harness or connectors.



3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-173](#). "Component Inspection".

OK or NG

OK >> GO TO 5.

NG >> Replace mass air flow sensor (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

Component Inspection

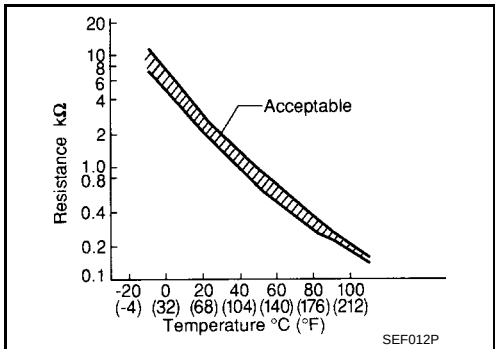
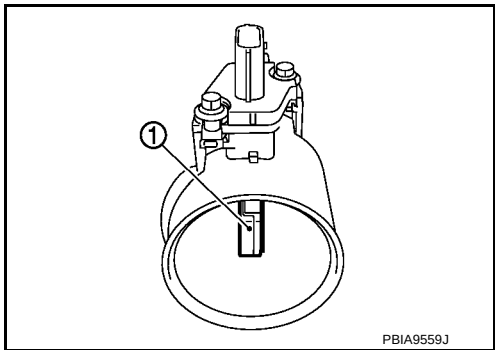
INFOID:000000005448265

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).



Removal and Installation

INFOID:000000005448266

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

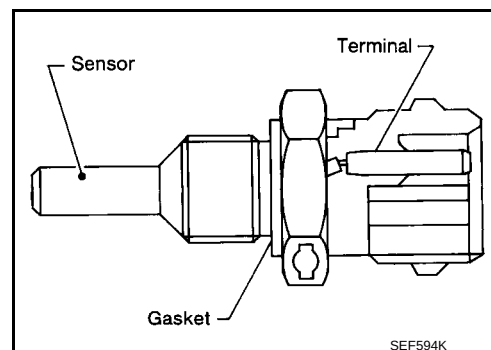
[VQ TYPE 1]

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:000000005448267

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

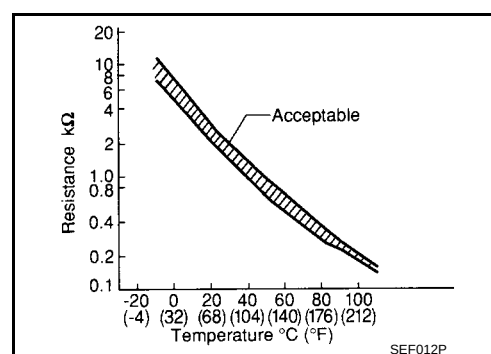


SEF594K

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



SEF012P

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:000000005448268

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	Approx. 4 minutes or more after engine starting.	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.		

DTC Confirmation Procedure

INFOID:000000005448269

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-176, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P0117, P0118 ECT SENSOR

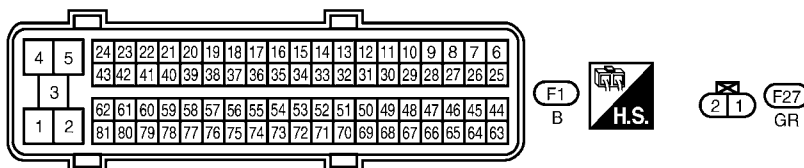
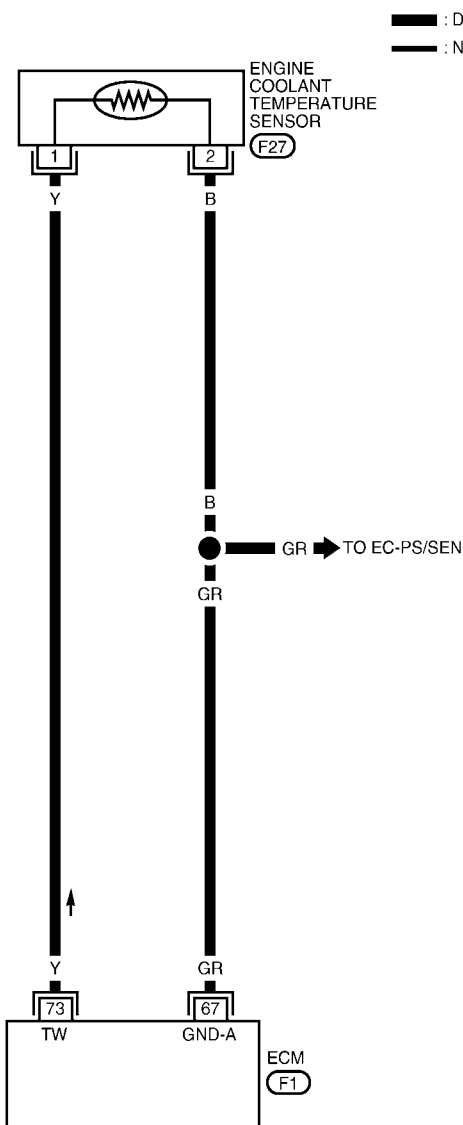
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448270

EC-ECTS-01



MBWA1281E

Diagnosis Procedure

INFOID:000000005448271

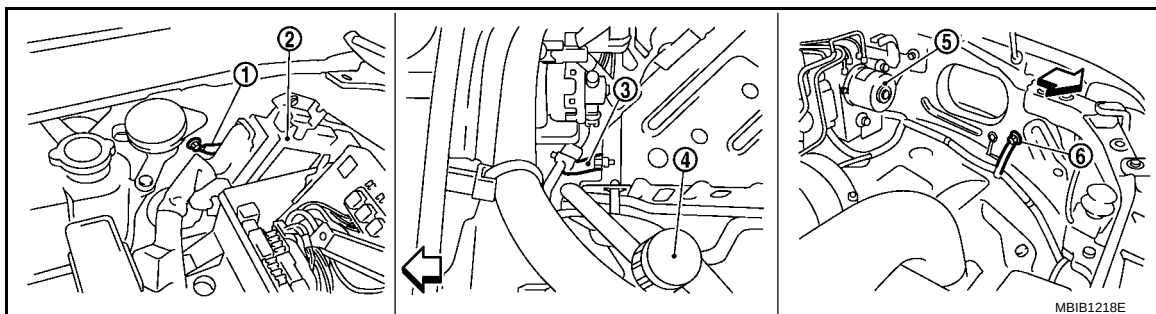
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

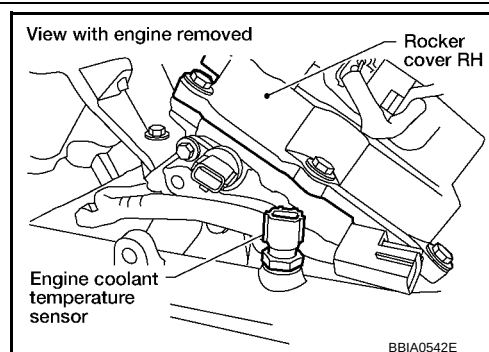
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



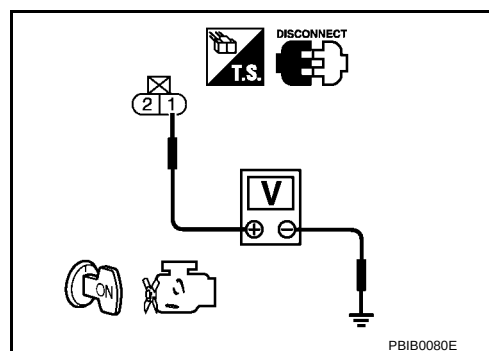
3. Check voltage between ECT sensor terminal 1 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-178. "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

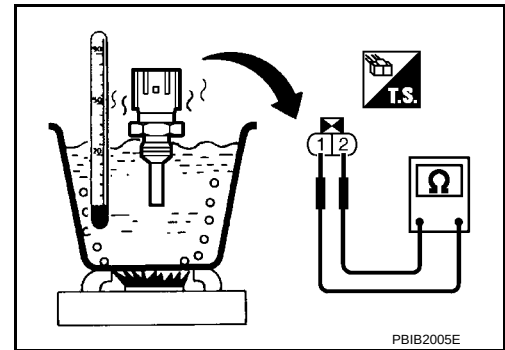
>> **INSPECTION END**

Component Inspection

INFOID:000000005448272

ENGINE COOLANT TEMPERATURE SENSOR

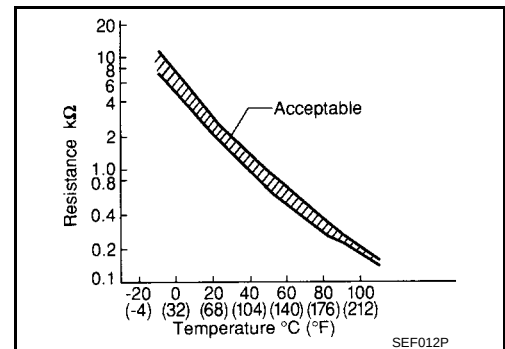
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

INFOID:000000005448273

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-30](#).

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

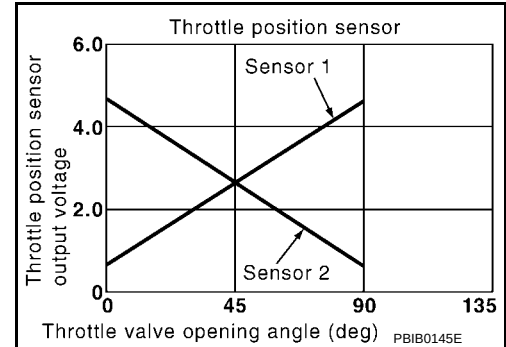
DTC P0122, P0123 TP SENSOR

Component Description

INFOID:000000005448274

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448275

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448276

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (The TP sensor 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 2) • Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448277

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

2. Check DTC.
3. If DTC is detected, go to [EC-181, "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT" above.

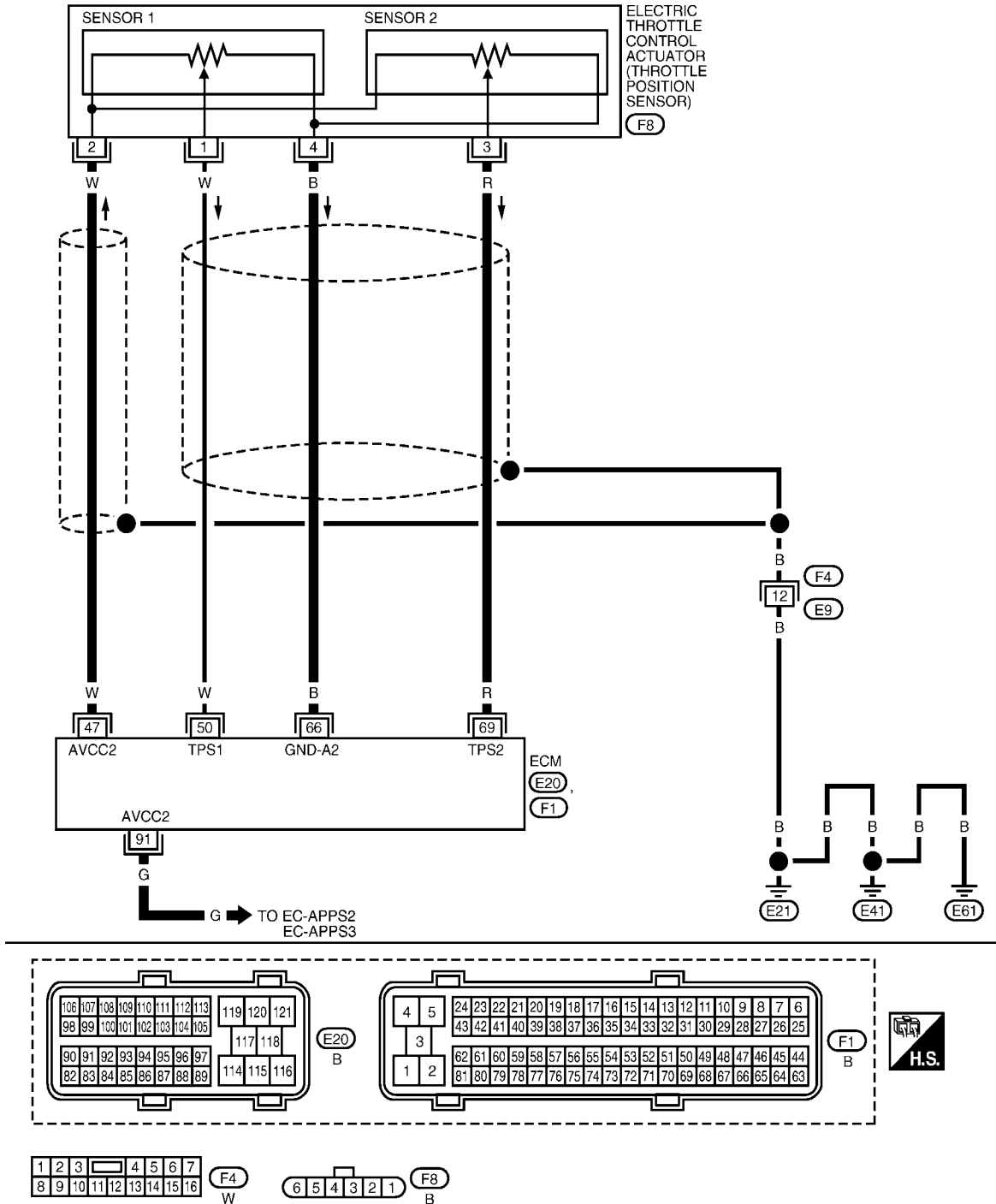
Wiring Diagram

INFOID:0000000005448278

EC-TPS2-01

■ : DETECTABLE LINE FOR DTC

— : NON-DETECTABLE LINE FOR DTC



MBWA1282E

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

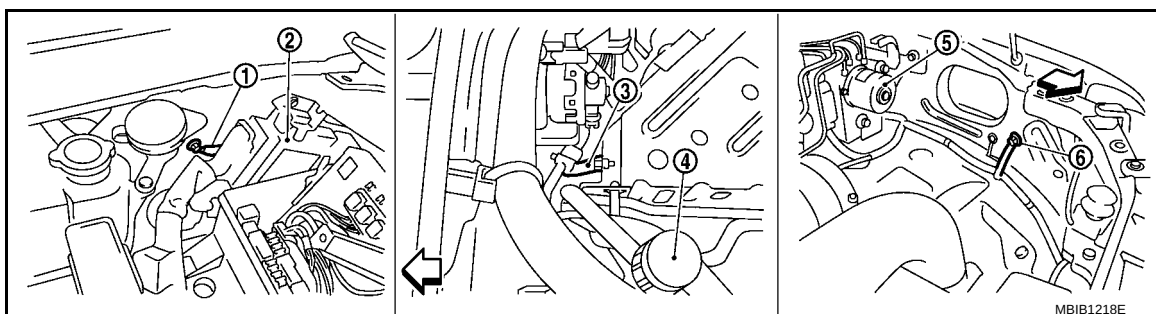
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448279

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

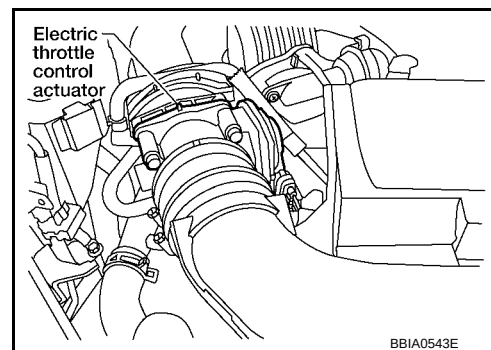
DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

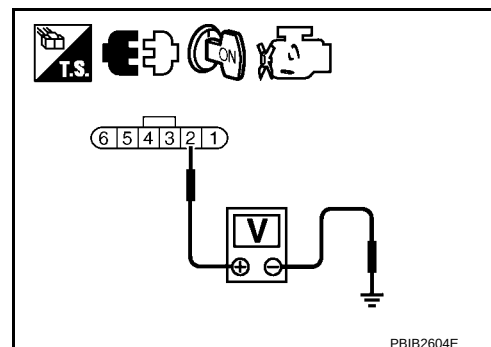


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-180
91	APP sensor terminal 1	EC-450

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-453, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

4. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to [EC-183, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448280

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

DTC P0122, P0123 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

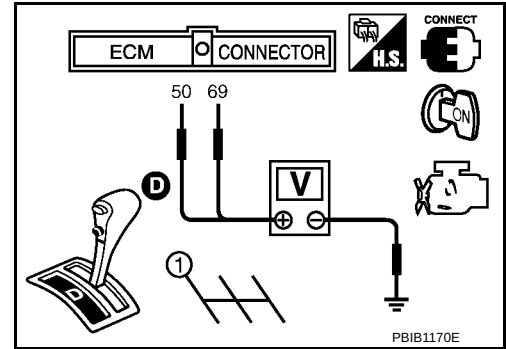
7. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-82, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



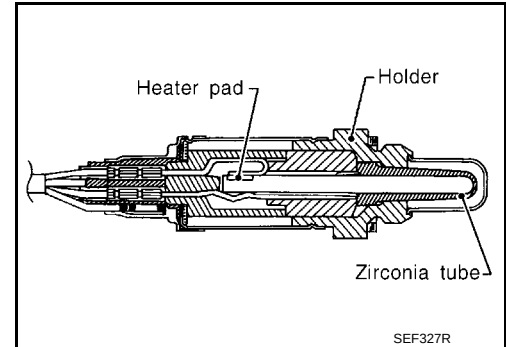
INFOID:0000000005448281

DTC P0138, P0158 HO2S2

Component Description

INFOID:000000005448282

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448283

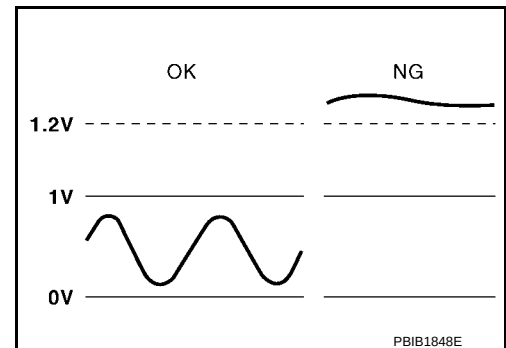
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	- Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

On Board Diagnosis Logic

INFOID:000000005448284

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted) - Heated oxygen sensor 2
P0158 0158 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448285

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.

DTC P0138, P0158 HO2S2

[VQ TYPE 1]

< SERVICE INFORMATION >

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-190, "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT" above.

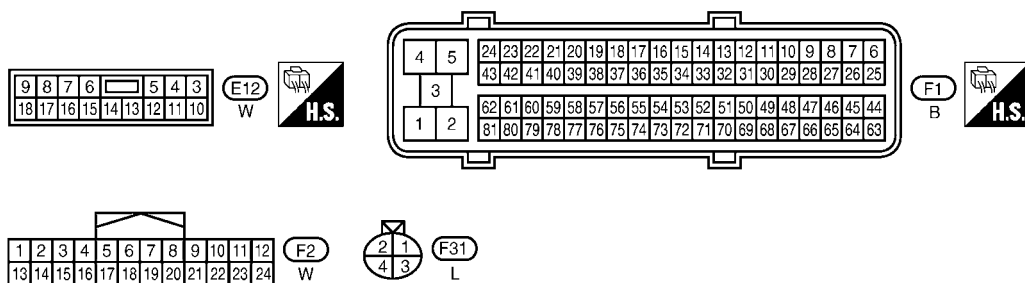
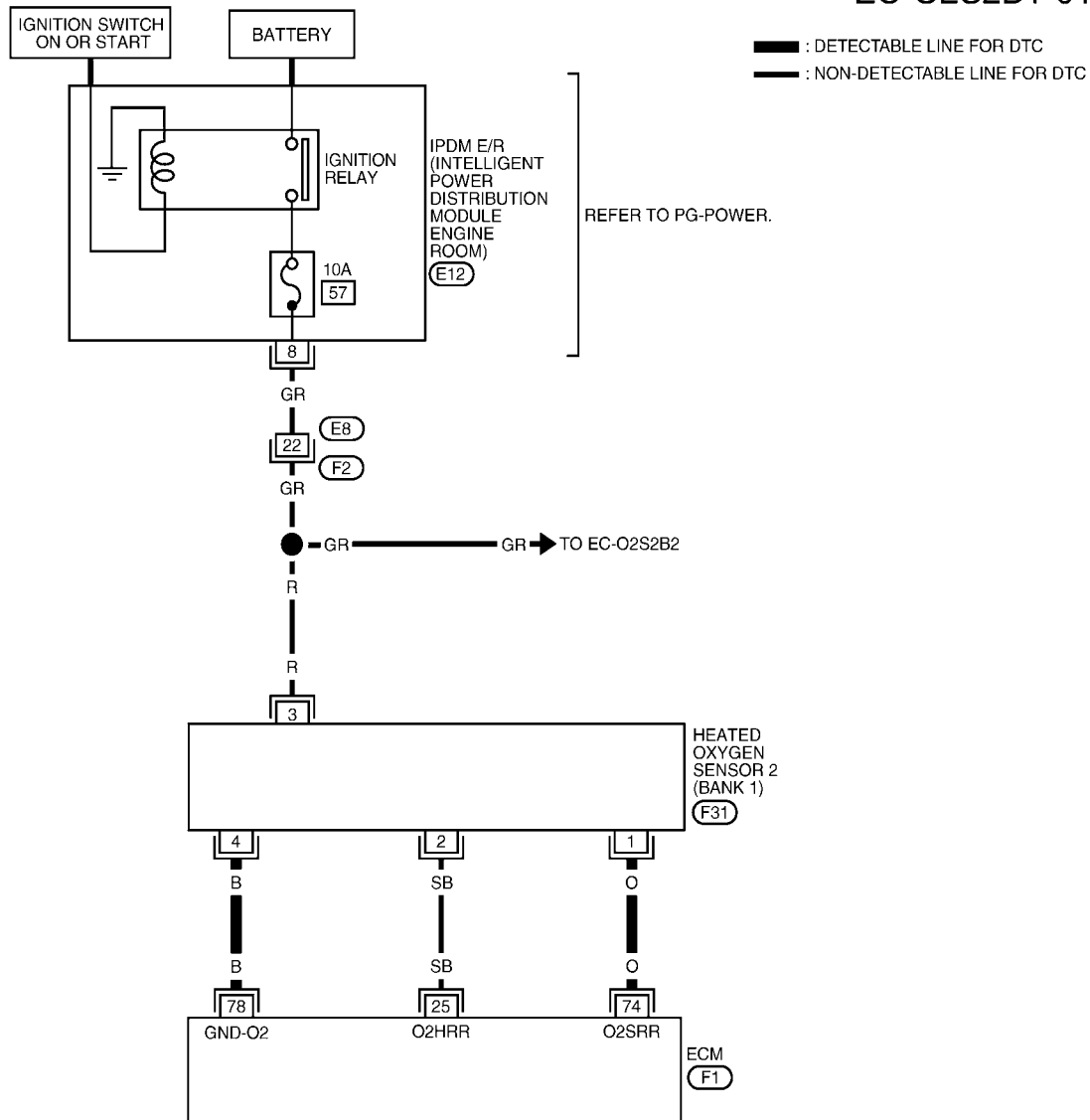
Wiring Diagram

INFOID:000000005448286

BANK 1

EC-O2S2B1-01

EC



JMBWA1211GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0138, P0158 HO2S2

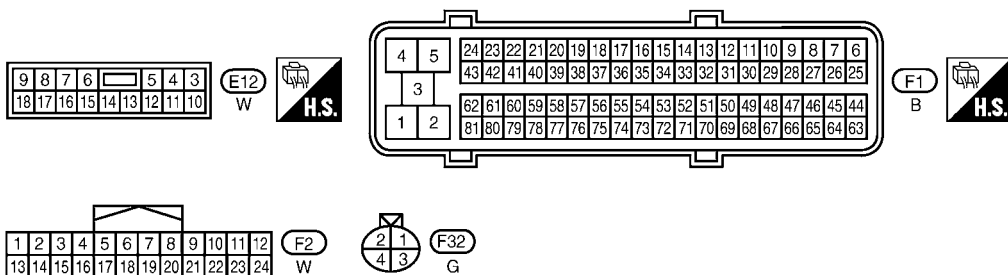
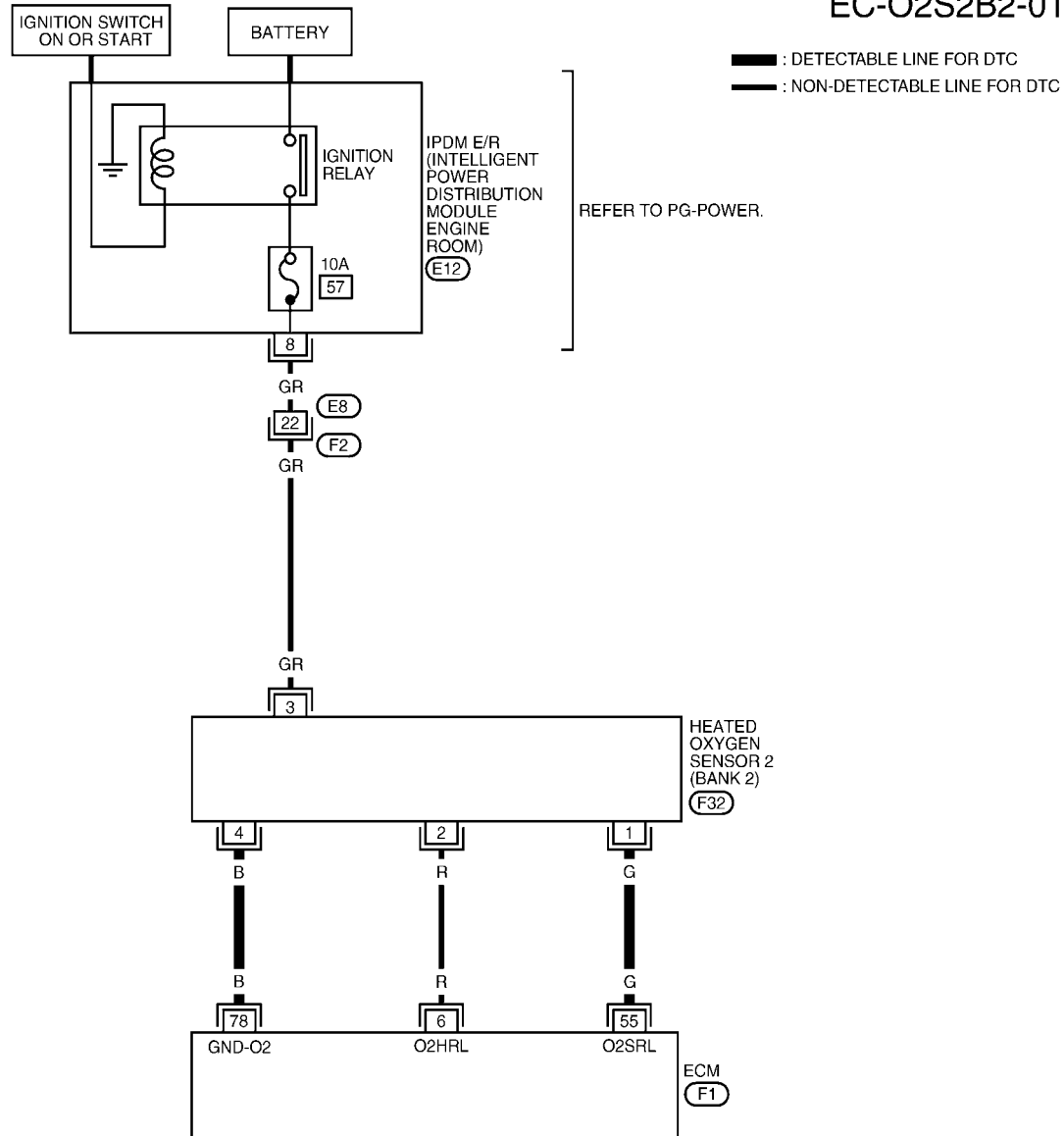
< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01



JMBWA1212GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

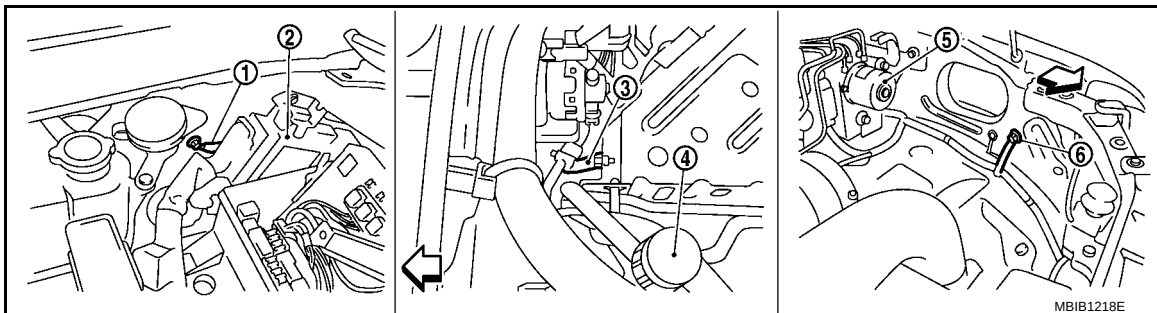
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448287

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

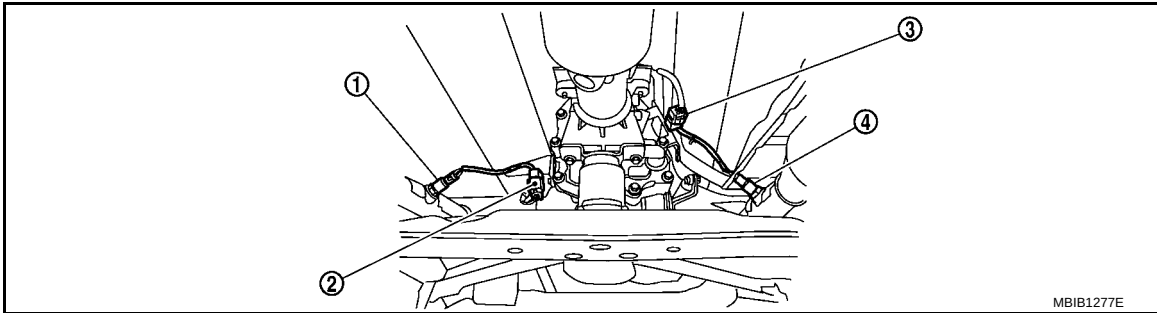
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to ground or short to power in harness or connectors.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	1
P0158	55	1	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	1
P0158	55	1	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-192. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

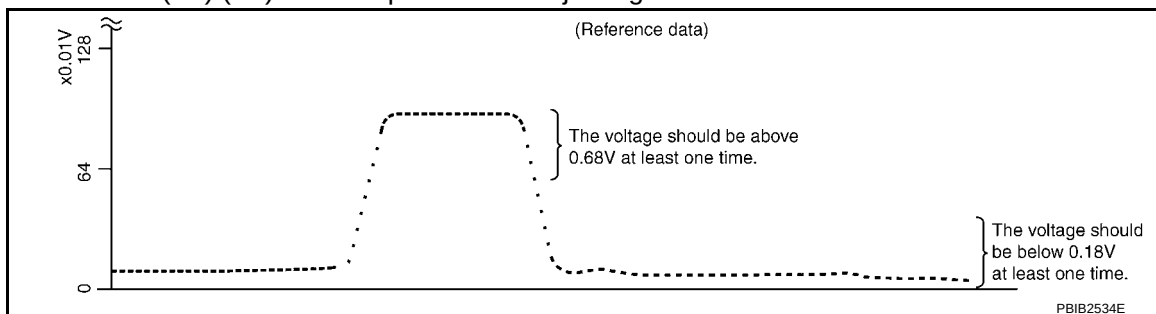
Component Inspection

INFOID:000000005448288

HEATED OXYGEN SENSOR 2

⑧ With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

"HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

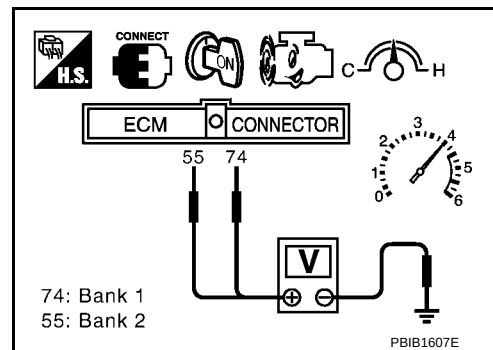
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.

< SERVICE INFORMATION >

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

**CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005448289

HEATED OXYGEN SENSOR 2

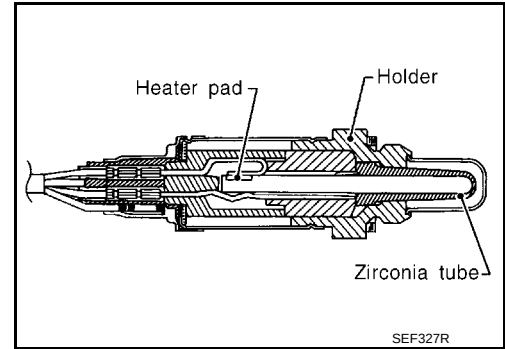
Refer to [EM-23](#).

DTC P0139, P0159 HO2S2

Component Description

INFOID:000000005448290

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448291

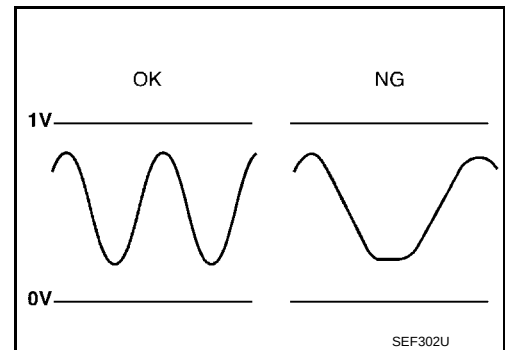
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	- Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

On Board Diagnosis Logic

INFOID:000000005448292

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139 (Bank 1)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	- Harness or connectors (The sensor circuit is open or shorted) - Heated oxygen sensor 2 - Fuel pressure - Fuel injector - Intake air leaks
P0159 0159 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448293

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT screen when all tests “COND1”, “COND2” and “COND3” are completed.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.

 WITH CONSULT

Procedure for COND1

For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F)

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
6. Touch “START”.
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
If “COMPLETED” appears on CONSULT screen, go to step 2 in Procedure for COND3.
If “COMPLETED” does not appear on CONSULT screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105 °C
Shift lever	Suitable position

NOTE:

- If “TESTING” is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.
- If “COMPLETED” already appears at “COND2” on CONSULT screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.

Procedure for COND2

1. While driving, release accelerator pedal completely with “OD” OFF (A/T models only) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

NOTE:

If “COMPLETED” already appears at “COND3” on CONSULT screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.

Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
If “NG” is displayed, refer to [EC-200, “Diagnosis Procedure”](#).
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
 - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 - b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT.
 - c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT.
 - d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.

Overall Function Check

INFOID:000000005448294

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

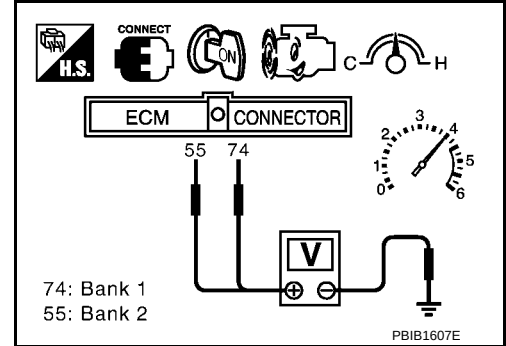
 WITH GST

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

[VQ TYPE 1]

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
A change of voltage should be more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to [EC-200. "Diagnosis Procedure"](#).



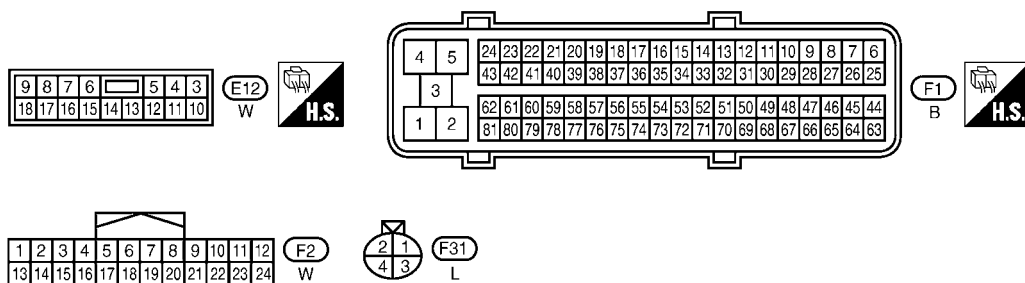
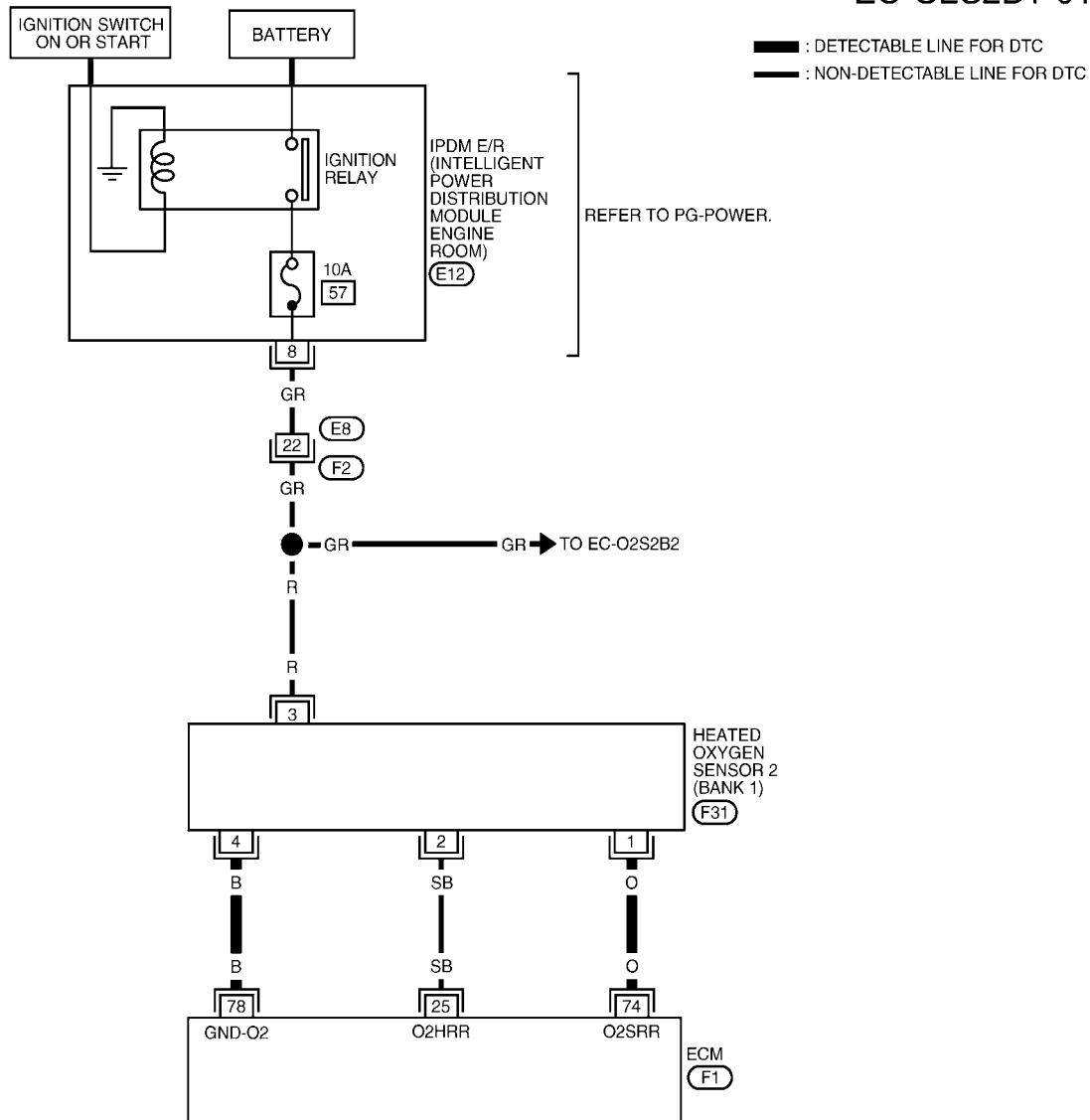
Wiring Diagram

INFOID:000000005448295

BANK 1

EC-O2S2B1-01

EC



JMBWA1211GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

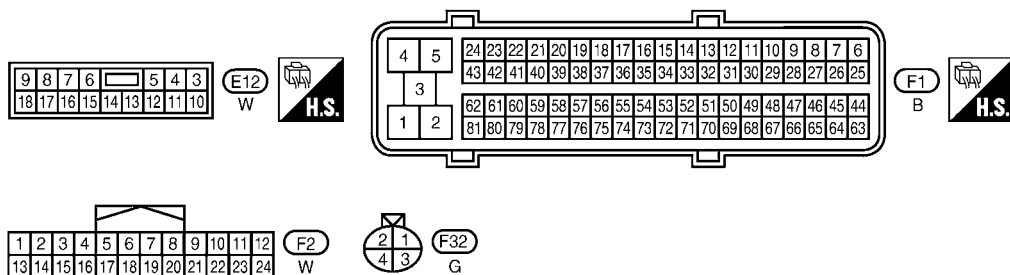
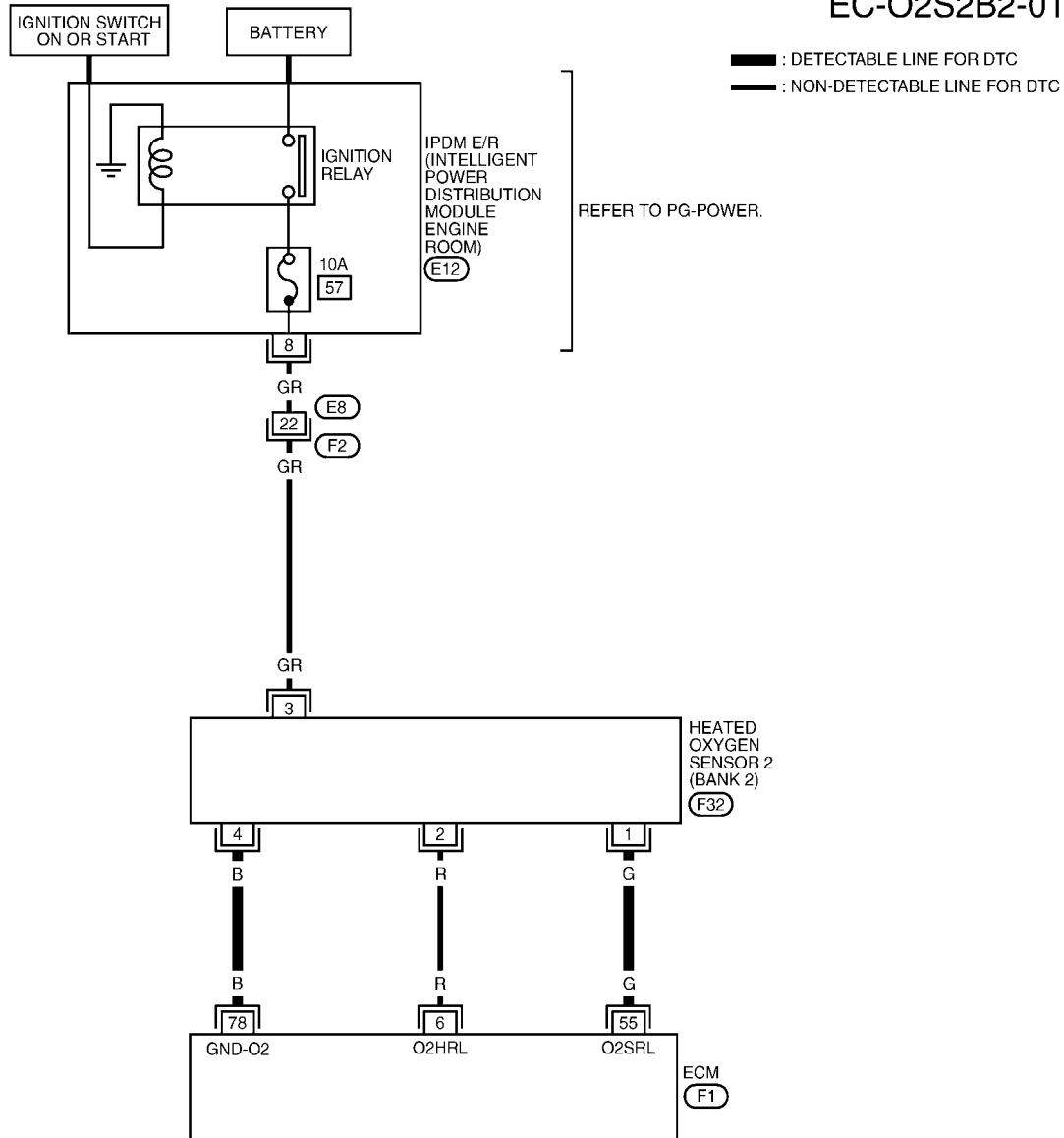
[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



JMBWA1212GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

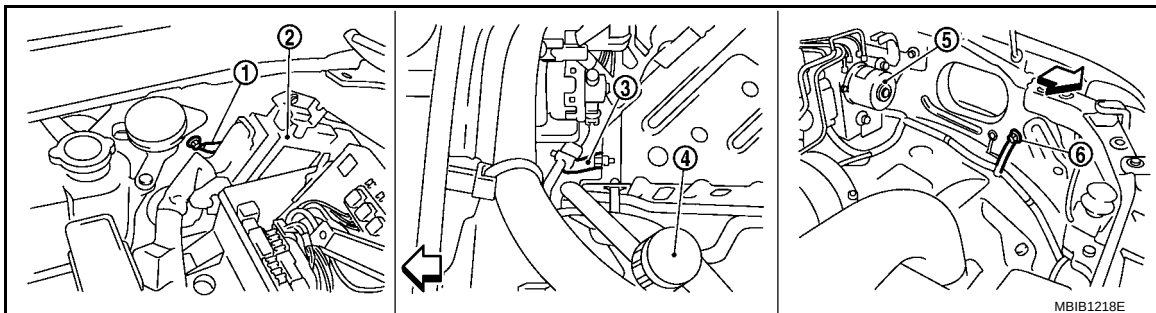
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448296

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↖ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?

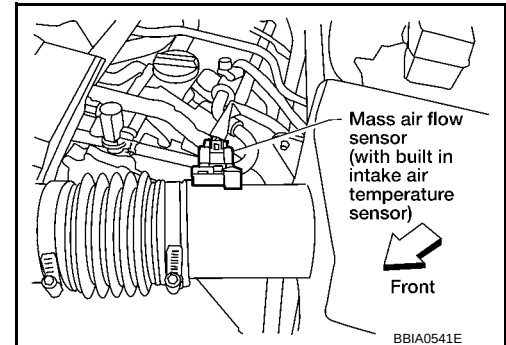
< SERVICE INFORMATION >

Is it difficult to start engine?

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-53. "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
Is it difficult to start engine?

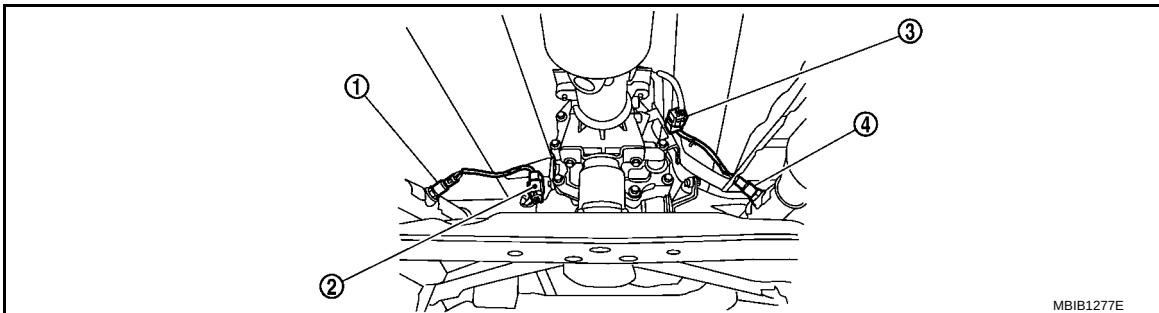


Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-204](#) or [EC-214](#).
No >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	74	1	1
P0159	55	1	2

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	74	1	1
P0159	55	1	2

Continuity should not exist.

- Also check harness for short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-202. "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

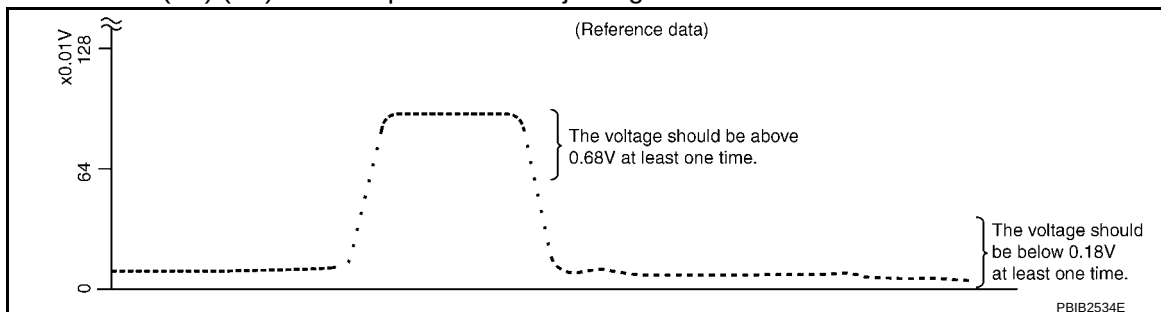
Component Inspection

INFOID:000000005448297

HEATED OXYGEN SENSOR 2

With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

DTC P0139, P0159 HO2S2

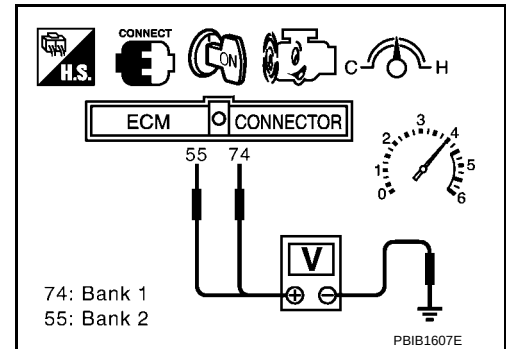
< SERVICE INFORMATION >

[VQ TYPE 1]

- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005448298

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:000000005448299

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171 (Bank 1)	Fuel injection system too lean	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	- Intake air leaks - Air fuel ratio (A/F) sensor 1 - Fuel injector - Exhaust gas leaks - Incorrect fuel pressure - Lack of fuel - Mass air flow sensor - Incorrect PCV hose connection
P0174 0174 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448300

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction.
Perform the following procedure is advised.
 - Crank engine while depressing accelerator pedal.
 - If engine starts, go to [EC-209, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.
- Keep engine at idle for at least 10 minutes.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-209, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, performing the following procedure is advised.
 - Turn ignition switch OFF and wait at least 10 seconds.
 - Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

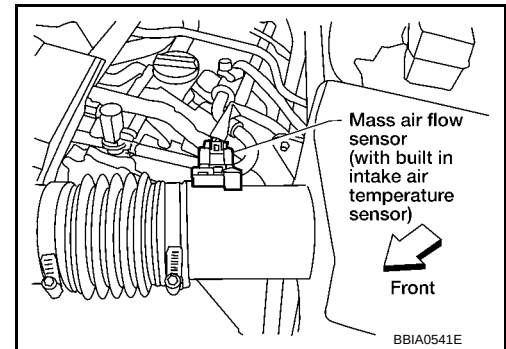
Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. Check 1st trip DTC.

10. The 1st trip DTC is detected, go to [EC-209, "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
7. Select Service \$04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service \$07 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-209, "Diagnosis Procedure"](#).



NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.

11. Crank engine while depressing accelerator pedal. If engine starts, go to [EC-209, "Diagnosis Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

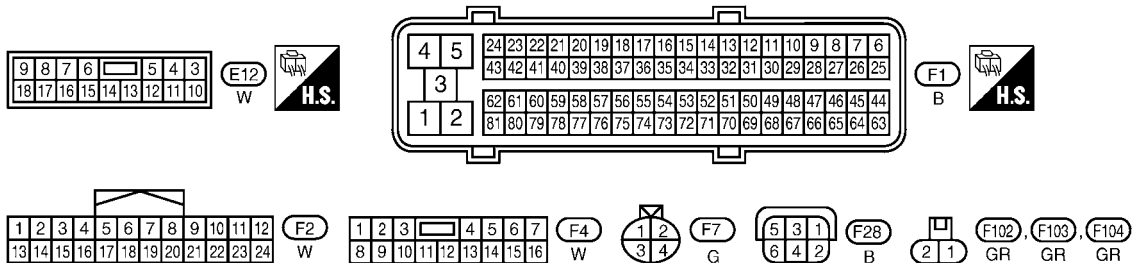
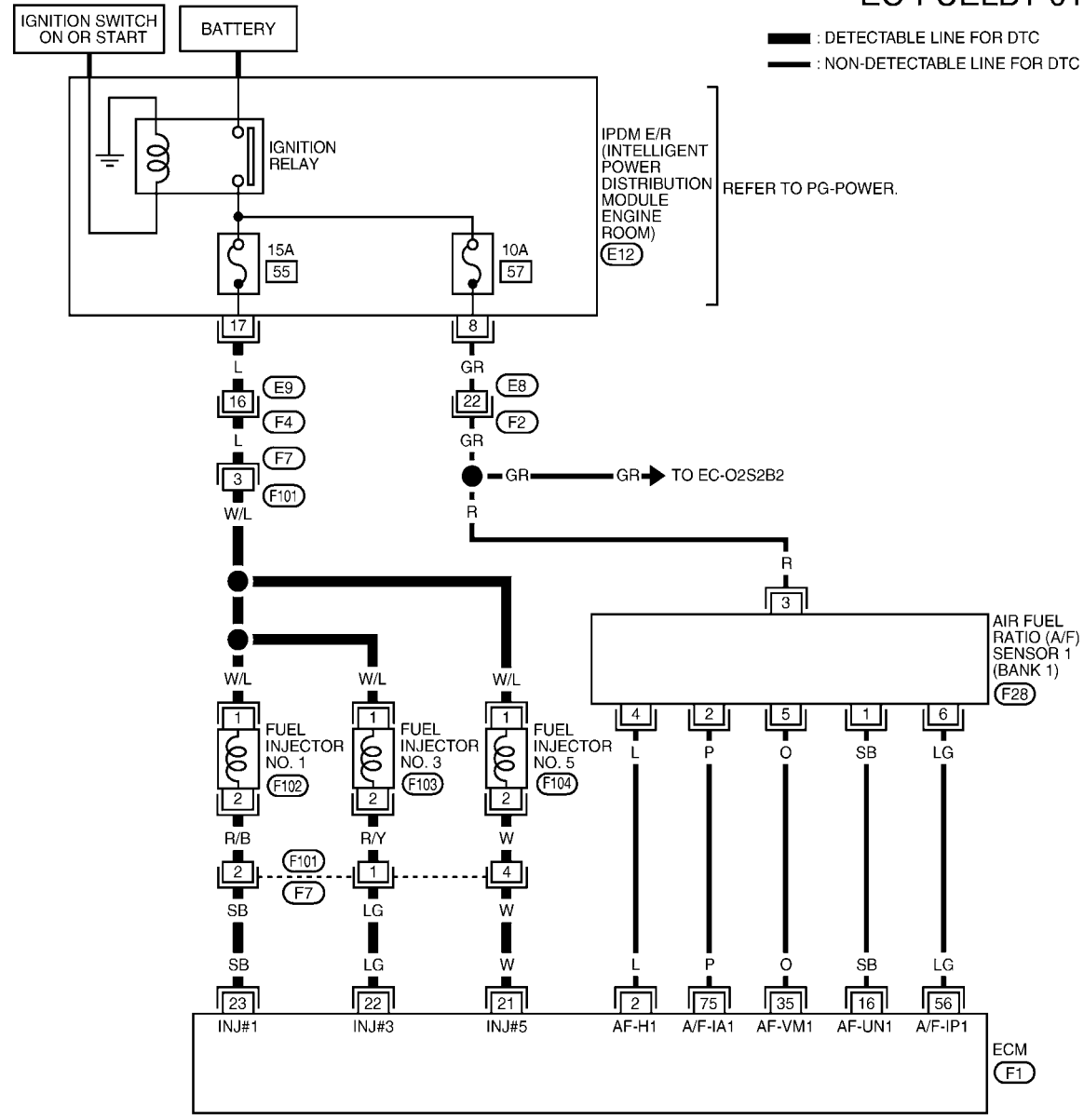
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448301

BANK 1

EC-FUELB1-01



JMBWA1213GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

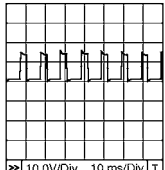
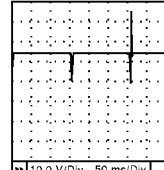
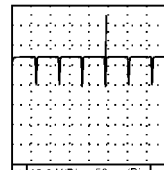
CAUTION:

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

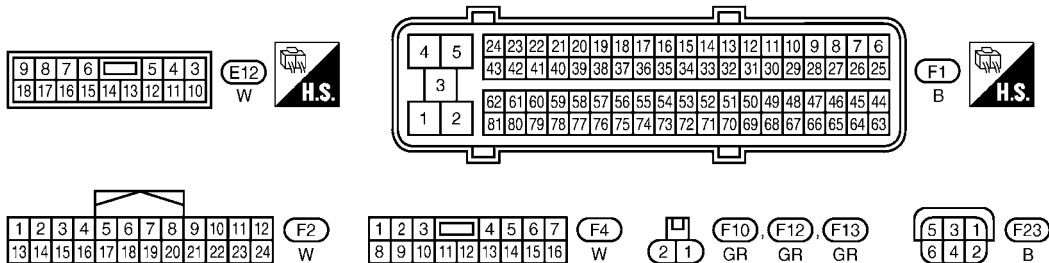
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

[VQ TYPE 1]

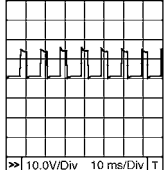
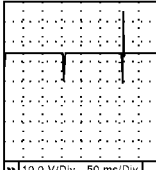
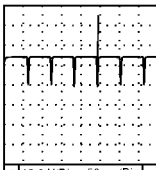
EC-FUELB2-01

**EC-208**

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
57 58 76 77	GR O V Y	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC985C
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

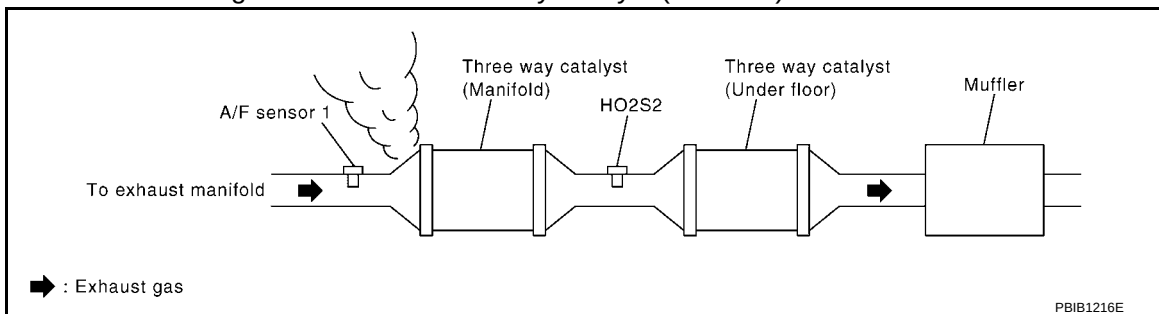
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448302

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace.

2.CHECK FOR INTAKE AIR LEAK

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

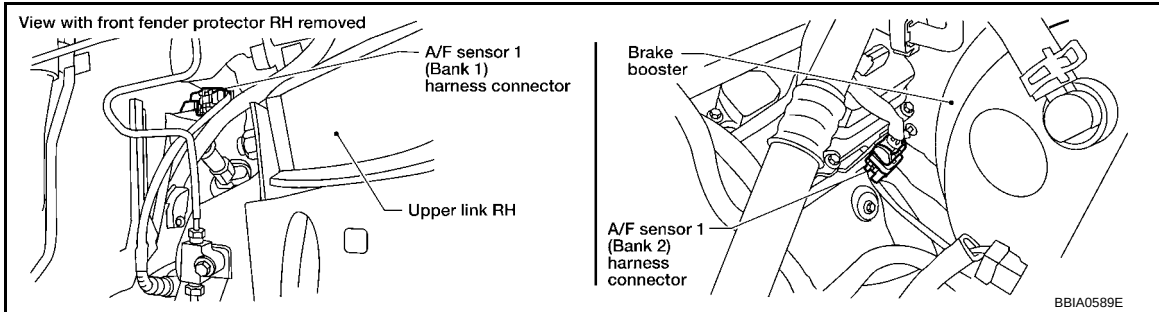
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC-84, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-84, "Fuel Pressure Check"](#).

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

At idling: 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK (With CONSULT)>>GO TO 6.
- OK (Without CONSULT)>>GO TO 7.
- NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-494](#).)
- Fuel pressure regulator (Refer to [EC-84](#), "Fuel Pressure Check".)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

 **With CONSULT**

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

OK or NG

- OK >> GO TO 8.
- NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-163](#).

7.CHECK MASS AIR FLOW SENSOR

 **With GST**

1. Install all removed parts.
2. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

OK or NG

- OK (P0171)>>GO TO 9.
- OK (P0174)>>GO TO 11.
- NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-163](#).

8.CHECK FUNCTION OF FUEL INJECTOR

 **With CONSULT**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

- OK >> GO TO 12.
- NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

9.CHECK FUNCTION OF FUEL INJECTOR-I

 **Without CONSULT**

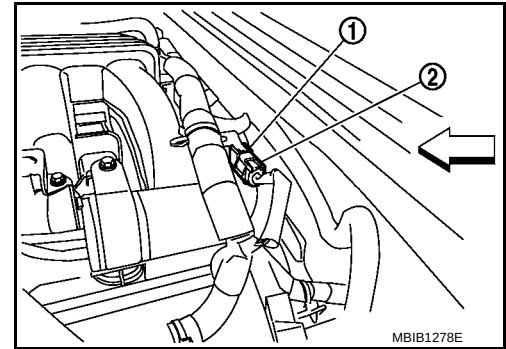
1. Stop engine.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

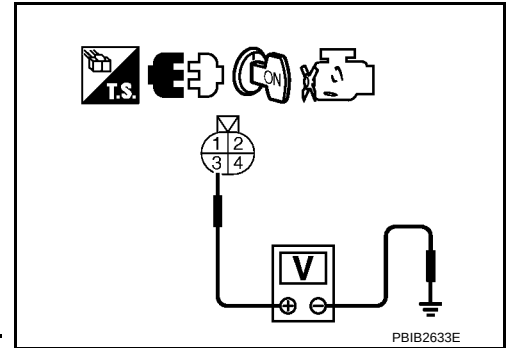
2. Disconnect harness connector F101 (1), F7 (2).
- ⇐: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

8. Also check harness for short to ground and short to power.

OK or NG

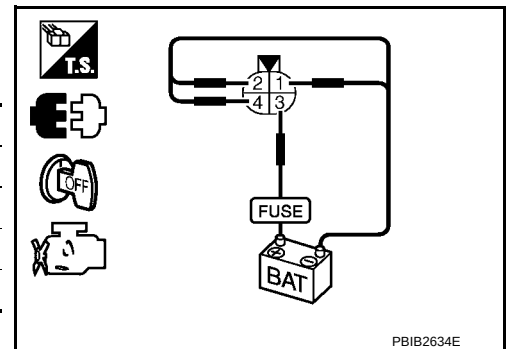
OK >> GO TO 10.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

10.CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(-)
1	3	2
3	3	1
5	3	4



Operating sound should exist.

OK or NG

OK >> GO TO 12.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

11.CHECK FUNCTION OF FUEL INJECTOR

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

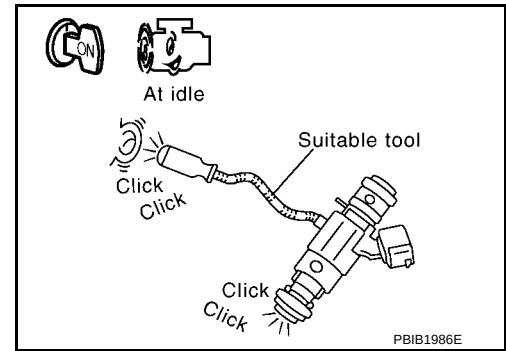
< SERVICE INFORMATION >

1. Start engine.
2. Listen to fuel injectors No.2, No.4, No.6 operating sound.

Clicking noise should exist.

OK or NG

- OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).



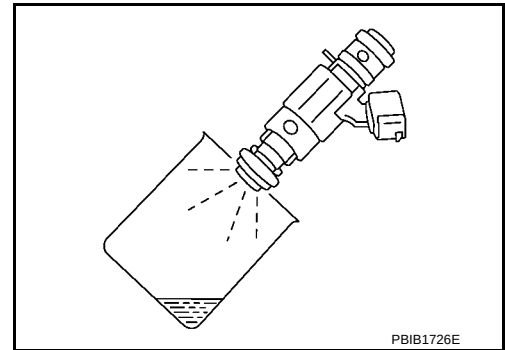
12.CHECK FUEL INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to [EM-36](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
5. For DTC P0171, reconnect fuel injector harness connectors on bank 1.
For DTC P0174, reconnect fuel injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each fuel injector.
8. Crank engine for about 3 seconds.
For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1.
For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.

Fuel should be sprayed evenly for each fuel injector.

OK or NG

- OK >> GO TO 13.
NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



13.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:000000005448303

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172 (Bank 1)	Fuel injection system too rich	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	- Air fuel ratio (A/F) sensor 1 - Fuel injector - Exhaust gas leaks - Incorrect fuel pressure - Mass air flow sensor
P0175 0175 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448304

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
4. Clear the self-learning control coefficient by touching "CLEAR".
5. Start engine.
If it is difficult to start engine, the fuel injection system has a malfunction.
Perform the following procedure is advised.
 - a. Crank engine while depressing accelerator pedal.
 - b. If engine starts, go to [EC-209, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.
6. Keep engine at idle for at least 10 minutes.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-209, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, performing the following procedure is advised.
 - a. Turn ignition switch OFF and wait at least 10 seconds.
 - b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

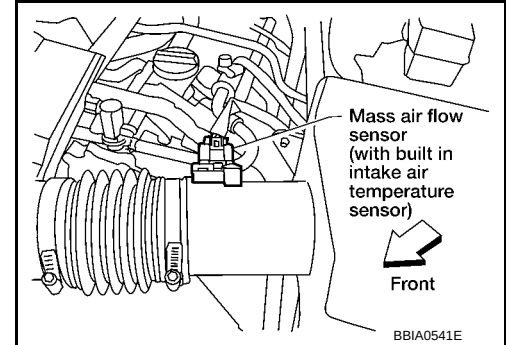
9. Check 1st trip DTC.

10. Crank engine while depressing accelerator pedal.

The 1st trip DTC is detected, go to [EC-219, "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service \$03 with GST. Make sure DTC P0102 is detected.
6. Select Service \$04 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select Service \$07 with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to [EC-219, "Diagnosis Procedure"](#).



NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.

10. Crank engine while depressing accelerator pedal.

If engine starts, go to [EC-219, "Diagnosis Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

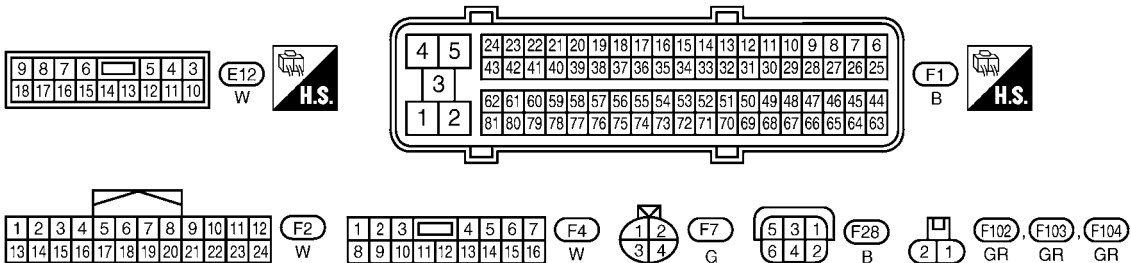
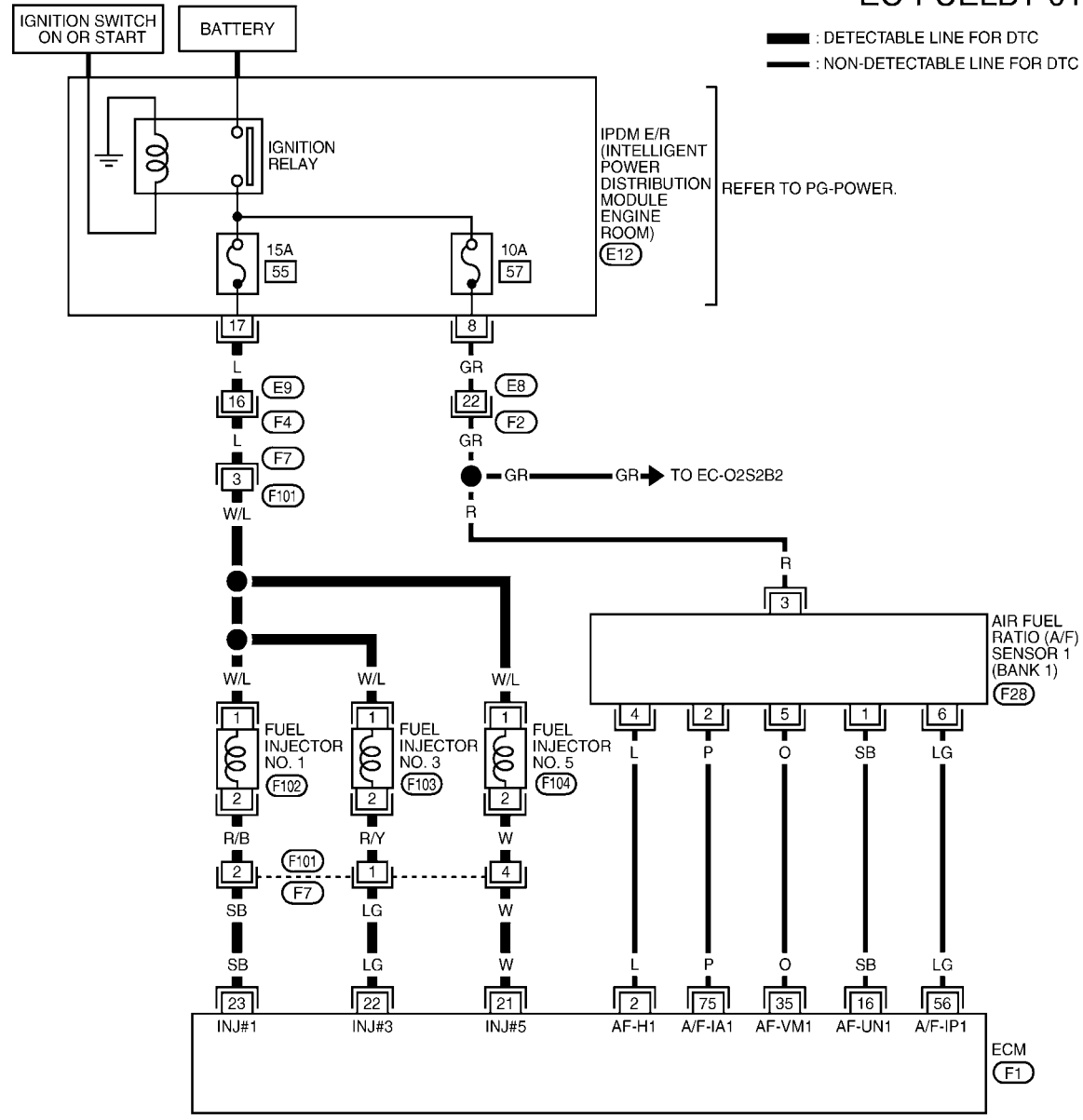
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448305

BANK 1

EC-FUELB1-01



JMBWA1213GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

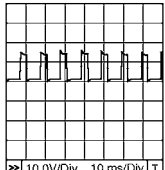
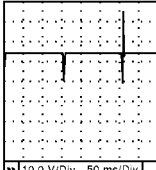
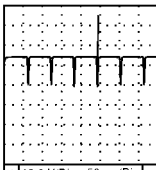
CAUTION:

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

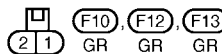
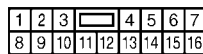
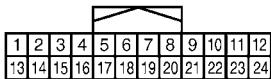
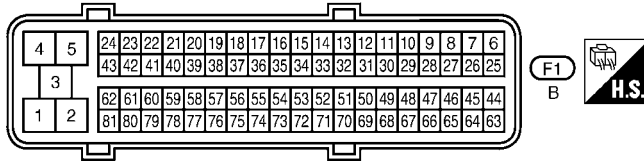
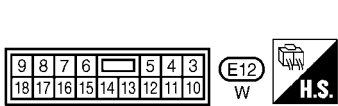
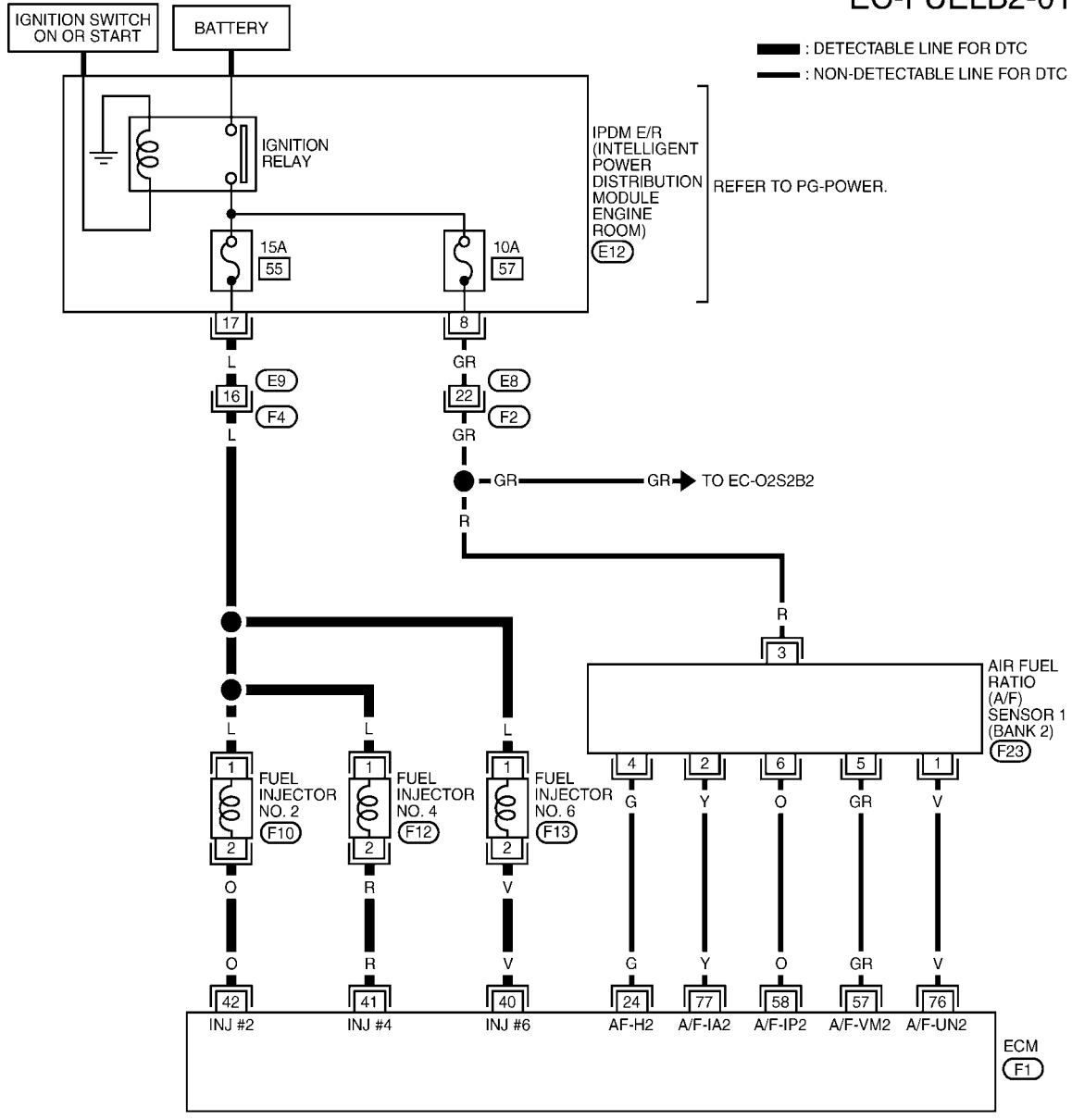
DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-FUELB2-01



JMBWA1214GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

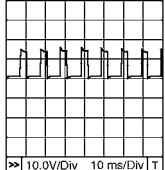
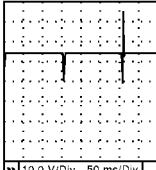
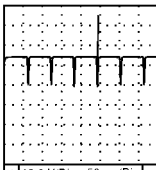
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
57 58 76 77	GR O V Y	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC985C
				Approximately 2.6V Approximately 2.3V Approximately 3.1V Approximately 2.3V

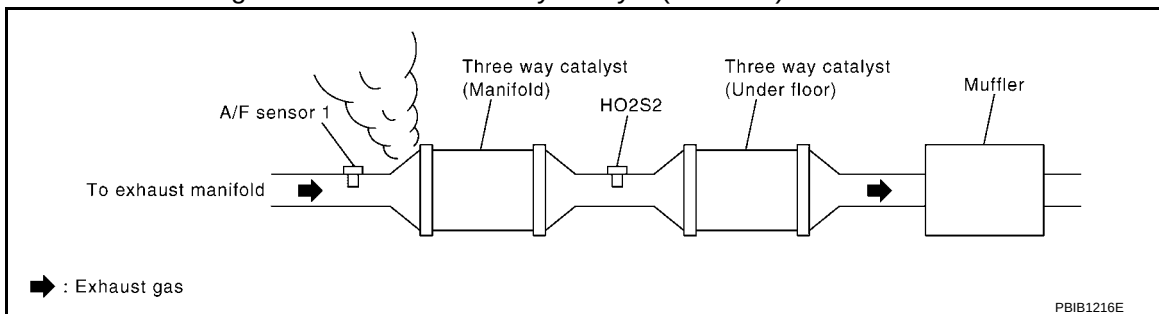
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000005448306

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace.

2.CHECK FOR INTAKE AIR LEAK

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

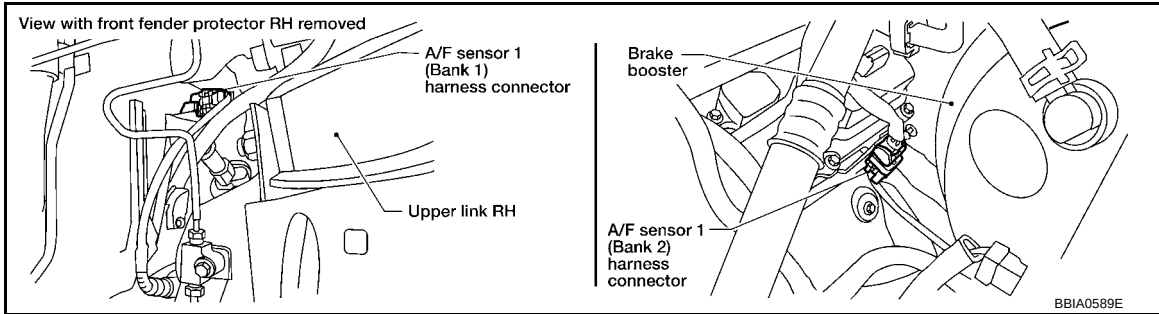
Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal		ECM terminal	
Bank 1	1		16	
	2		75	
	5		35	
	6		56	
Bank 2	1		76	
	2		77	
	5		57	
	6		58	

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC-84, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-84, "Fuel Pressure Check"](#).

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

At idling: 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK (With CONSULT)>>GO TO 6.
- OK (Without CONSULT)>>GO TO 7.
- NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to, [EC-494](#).)
- Fuel pressure regulator (Refer to [EC-84](#), "Fuel Pressure Check".)

>> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

 **With CONSULT**

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

OK or NG

- OK >> GO TO 8.
- NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-163](#).

7.CHECK MASS AIR FLOW SENSOR

 **With GST**

1. Install all removed parts.
2. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

OK or NG

- OK (P0172)>>GO TO 9.
- OK (P0175)>>GO TO 11.
- NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-163](#).

8.CHECK FUNCTION OF FUEL INJECTOR

 **With CONSULT**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

- OK >> GO TO 12.
- NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

9.CHECK FUNCTION OF FUEL INJECTOR-I

 **Without CONSULT**

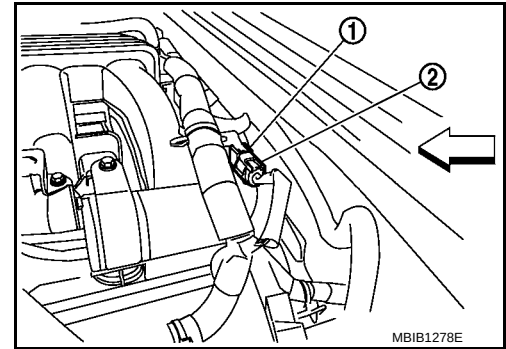
1. Stop engine.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

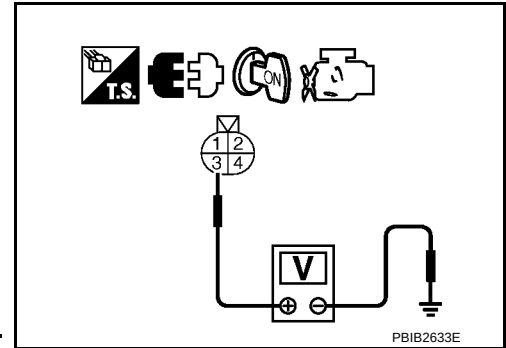
2. Disconnect harness connector F101 (1), F7 (2).
- ⇐: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

8. Also check harness for short to ground and short to power.

OK or NG

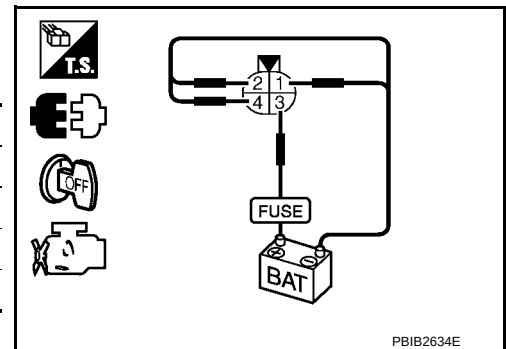
OK >> GO TO 10.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

10.CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(-)
1	3	2
3	3	1
5	3	4



Operating sound should exist.

OK or NG

OK >> GO TO 12.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

11.CHECK FUNCTION OF FUEL INJECTOR

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VQ TYPE 1]

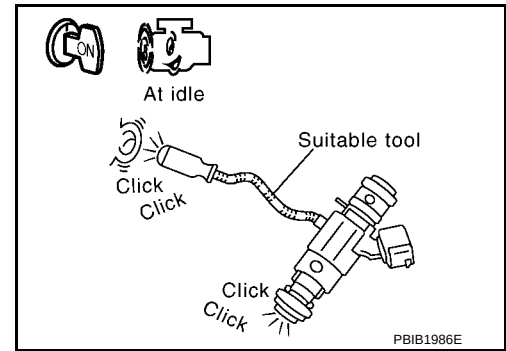
< SERVICE INFORMATION >

1. Start engine.
2. Listen to fuel injectors No.2, No.4, No.6 operating sound.

Clicking noise should exist.

OK or NG

- OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).



12.CHECK FUEL INJECTOR

1. Remove fuel tube assembly. Refer to [EM-36](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
Make sure fuel does not drip from fuel injector.

OK or NG

- OK (Does not drip.)>>GO TO 13.
NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

13.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

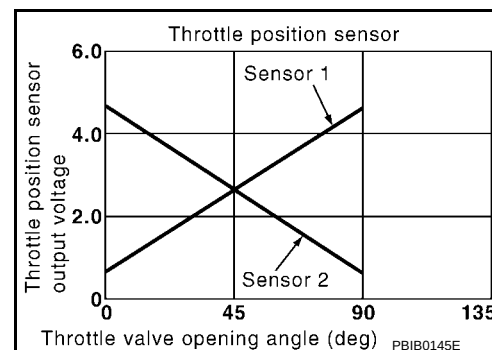
DTC P0222, P0223 TP SENSOR

Component Description

INFOID:000000005448307

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448308

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448309

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (The TP sensor 1 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor. (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448310

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P0222, P0223 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

- Check DTC.
- If DTC is detected, go to [EC-226, "Diagnosis Procedure"](#).

 WITH GST

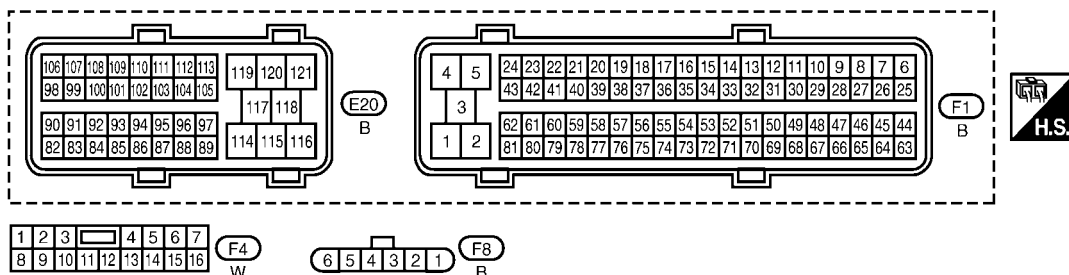
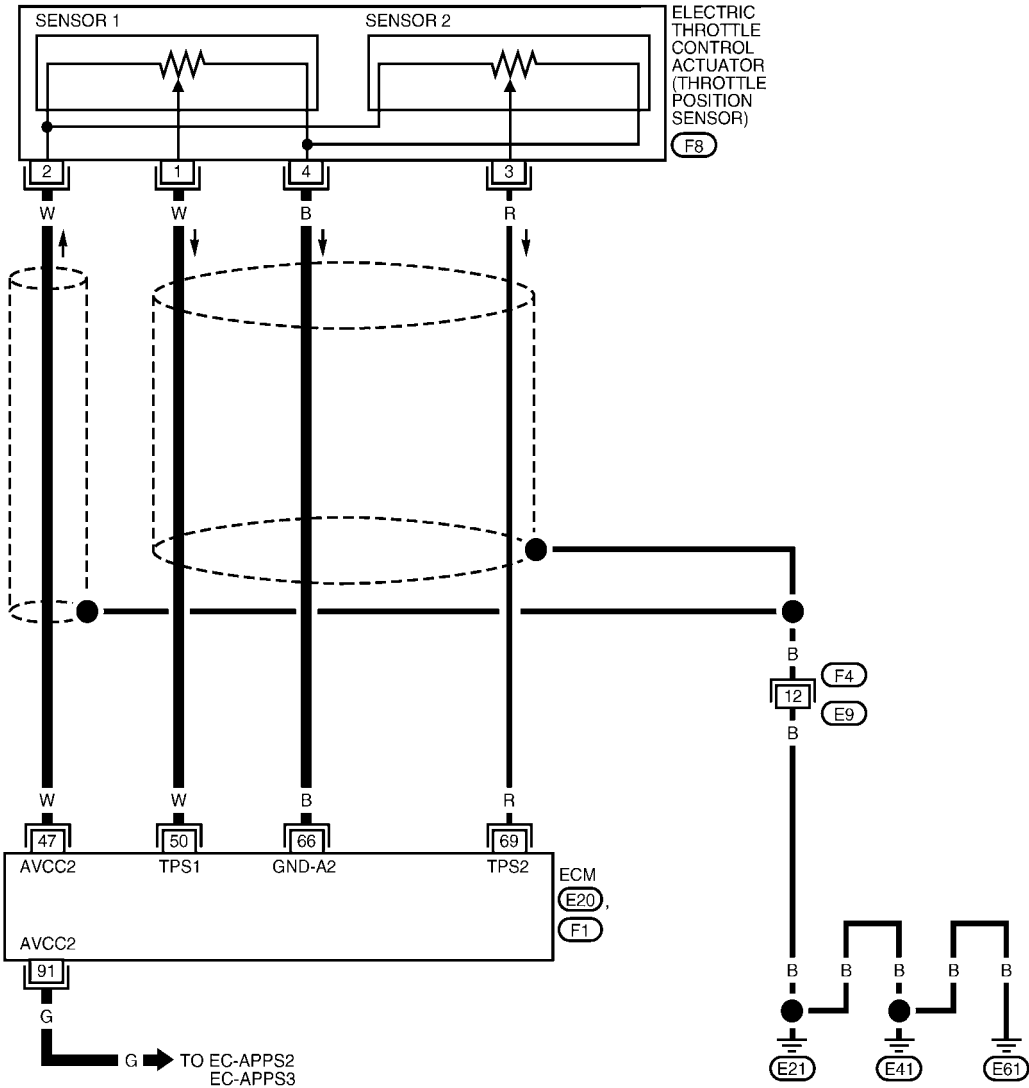
Follow the procedure "WITH CONSULT" above.

Wiring Diagram

INFOID:000000005448311

EC-TPS1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1288E

DTC P0222, P0223 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

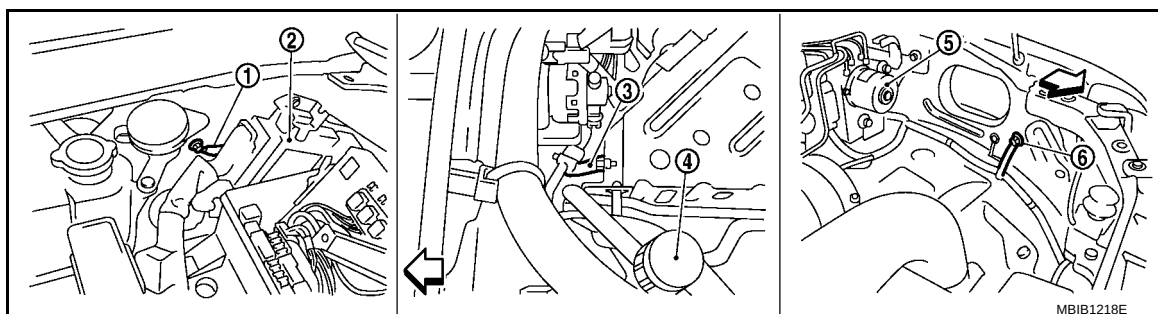
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448312

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

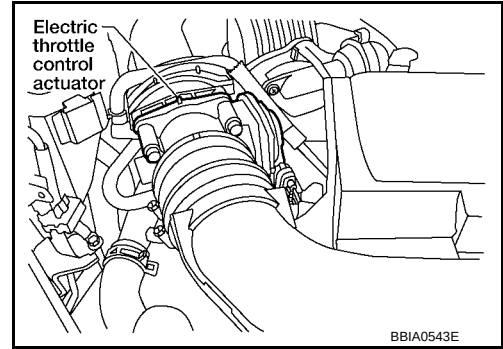
DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

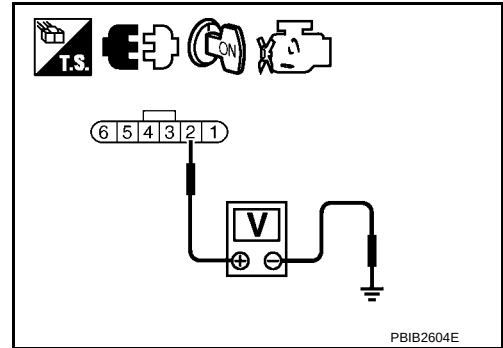


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-225
91	APP sensor terminal 1	EC-450

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-453, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

< SERVICE INFORMATION >

4. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to [EC-228, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448313

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

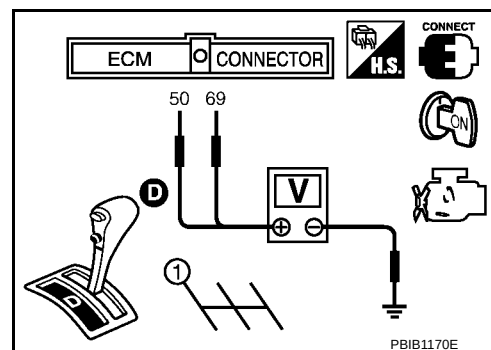
Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-82, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



INFOID:000000005448314

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

On Board Diagnosis Logic

INFOID:000000005448315

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • Air fuel ratio (A/F) sensor 1 • Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305 0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306 0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	

DTC Confirmation Procedure

INFOID:000000005448316

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

5. If 1st trip DTC is detected, go to [EC-231. "Diagnosis Procedure"](#).

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

INFOID:000000005448317

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- Listen for the sound of the intake air leak.
- Check PCV hose connection.

OK or NG

- OK >> GO TO 2.
NG >> Discover air leak location and repair.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

- OK (With CONSULT)>>GO TO 3.
OK (Without CONSULT)>>GO TO 4.
NG >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT

- Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- Is there any cylinder which does not produce a momentary engine speed drop?

Yes or No

- Yes >> GO TO 4.
No >> GO TO 10.

4.CHECK FUNCTION OF FUEL INJECTOR-I

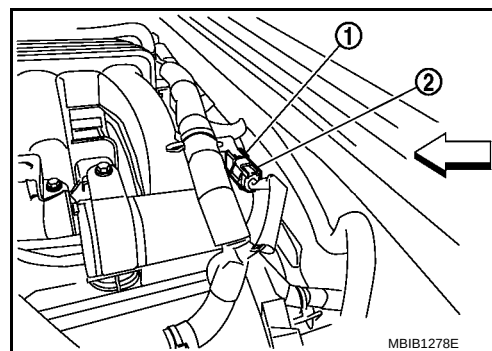
Without CONSULT

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

[VQ TYPE 1]

< SERVICE INFORMATION >

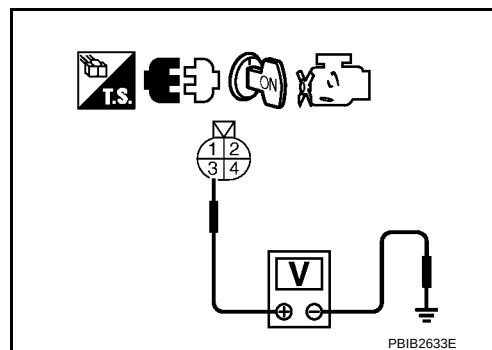
1. Turn ignition switch OFF.
2. Disconnect harness connector F101 (1), F7 (2).
- ⇐: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

8. Also check harness for short to ground and short to power.

OK or NG

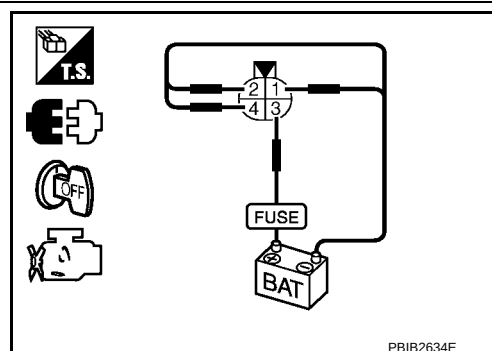
OK >> GO TO 5.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

5.CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(-)
1	3	2
3	3	1
5	3	4



Operating sound should exist.

OK or NG

OK >> GO TO 6.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

6.CHECK FUNCTION OF FUEL INJECTOR-III

1. Reconnect all harness connector disconnected.
2. Start engine.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

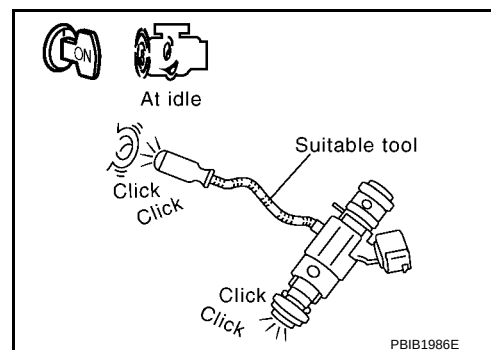
- Listen to fuel injectors No. 2, No. 4, No.6 operating sound.

Clicking noise should exist.

OK or NG

OK >> GO TO 7.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-488](#).

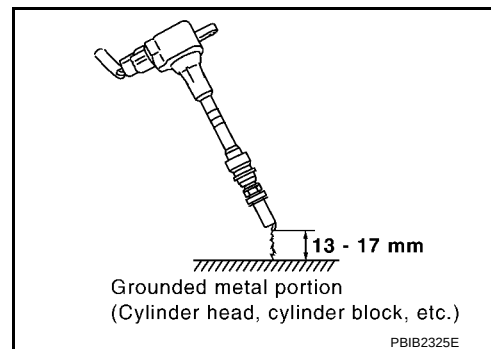
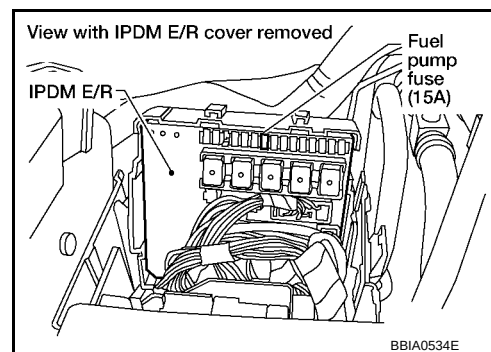


7. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- Remove ignition coil and spark plug of the cylinder to be checked.
- Crank engine for five seconds or more to remove combustion gas in the cylinder.
- Connect spark plug and harness connector to ignition coil.
- Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
- Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 11.

NG >> GO TO 8.

8. CHECK FUNCTION OF IGNITION COIL-II

- Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

OK >> GO TO 9.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

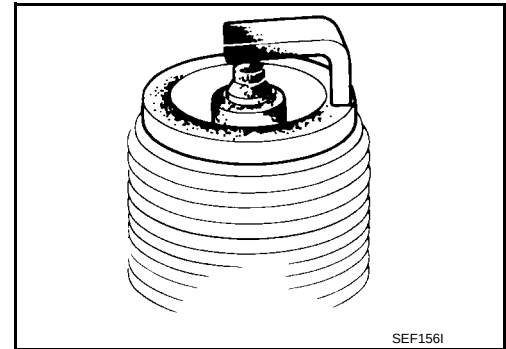
NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-499](#).

9.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

- OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-34, "Changing Spark Plugs \(Platinum-Tipped Type\)"](#).
- NG >> 1. Repair or clean spark plug.
2. GO TO 10.



10.CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

- OK >> **INSPECTION END**
- NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-34, "Changing Spark Plugs \(Platinum-Tipped Type\)"](#).

11.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-88, "On-Vehicle Service"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

12.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC-84, "Fuel Pressure Check"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-84, "Fuel Pressure Check"](#).

At idle: Approx. 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK >> GO TO 14.
- NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-494](#).)
- Fuel pressure regulator (Refer to [EC-84, "Fuel Pressure Check"](#).)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

14.CHECK IGNITION TIMING

Check the following items. Refer to [EC-76, "Basic Inspection"](#).

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

Items	Specifications
Target idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

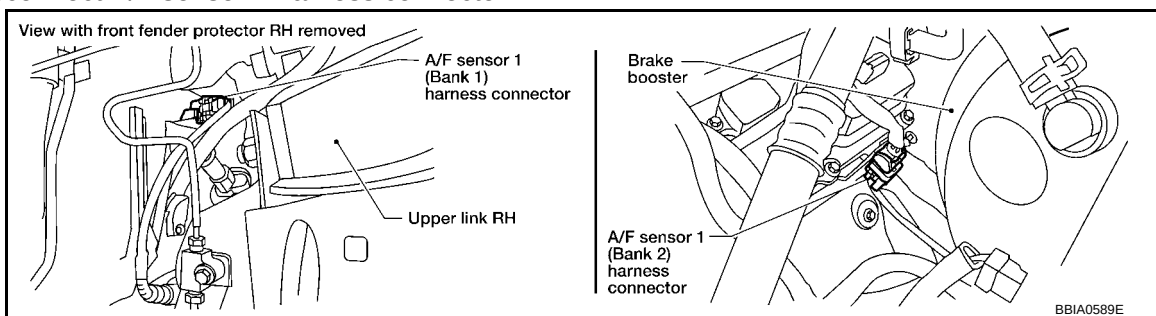
OK or NG

OK >> GO TO 15.

NG >> Follow the [EC-76. "Basic Inspection"](#).

15. CHECK A/F SENSOR 1 INPUT SIGNAL

- Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.



- Disconnect ECM harness connector.
- Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

- Also check harness for short to power.

OK or NG

OK >> GO TO 16.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

[VQ TYPE 1]

NG >> Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.

16. CHECK A/F SENSOR 1 HEATER

Refer to [EC-282. "Component Inspection"](#).

OK or NG

OK >> GO TO 18.

NG >> GO TO 17.

17. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

18. CHECK MASS AIR FLOW SENSOR

 **With CONSULT**

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

 **With GST**

Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g/s: at idling

7.0 - 20.0 g/s: at 2,500 rpm

OK or NG

OK >> GO TO 19.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-163](#).

19. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-93. "Symptom Matrix Chart"](#).

OK or NG

OK >> GO TO 20.

NG >> Repair or replace.

20. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to [EC-53. "Emission-related Diagnostic Information"](#).

>> GO TO 21.

21. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

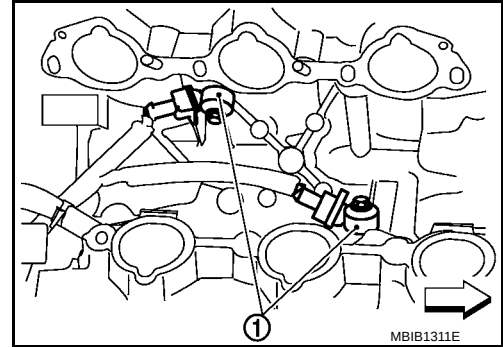
DTC P0327, P0328, P0332, P0333 KS

Component Description

INFOID:000000005448318

The knock sensor (1) is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

- : Vehicle front



On Board Diagnosis Logic

INFOID:000000005448319

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (bank 1)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0332 0332 (bank 2)			
P0328 0328 (bank 1)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	
P0333 0333 (bank 2)			

DTC Confirmation Procedure

INFOID:000000005448320

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

 WITH CONSULT

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-239, "Diagnosis Procedure"](#).

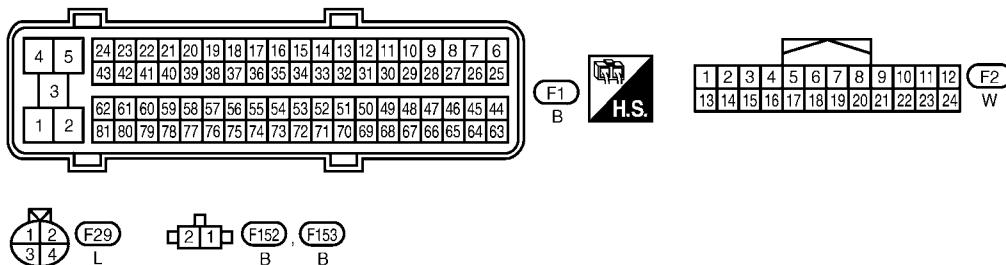
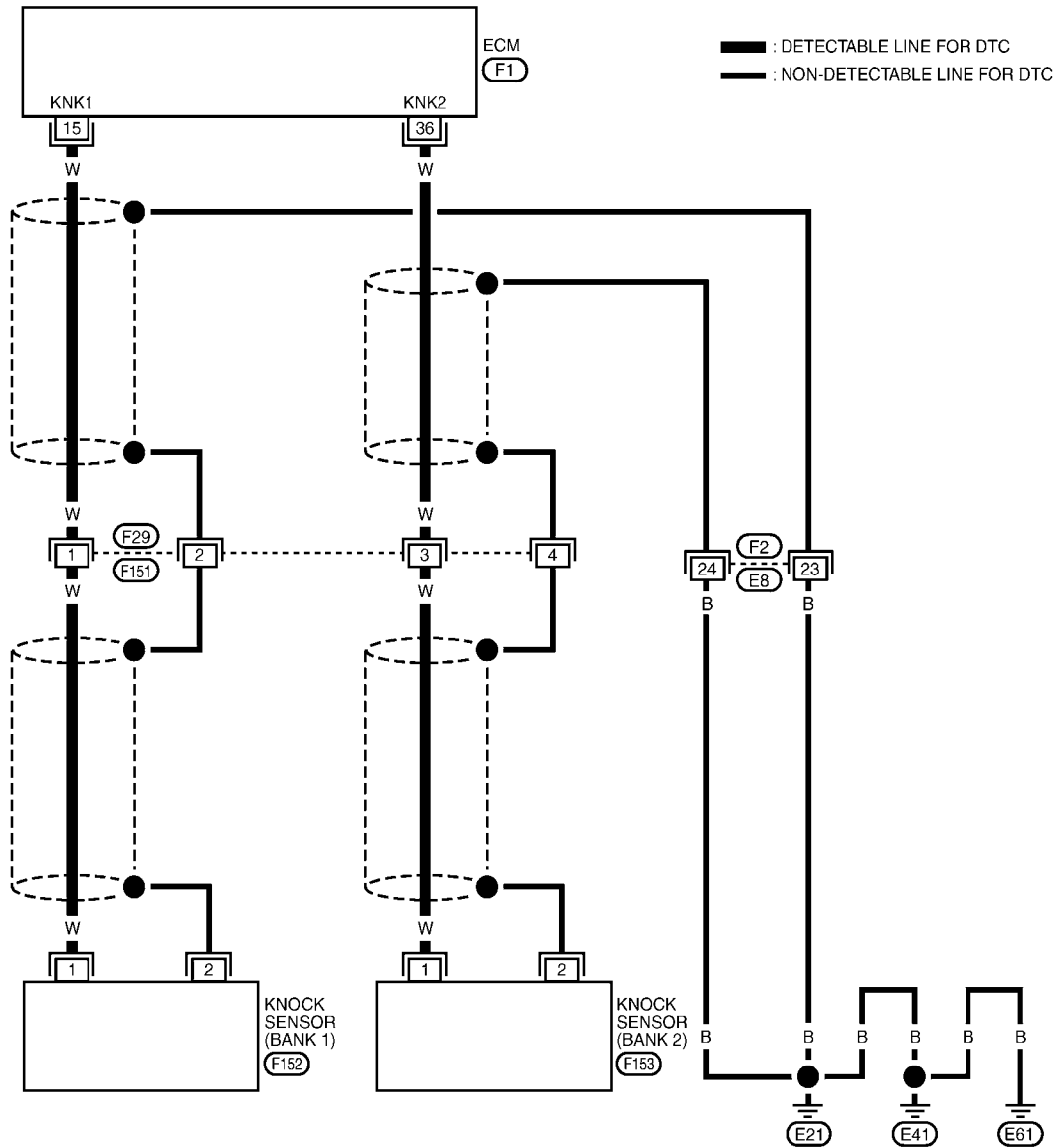
 WITH GST

Follow the procedure "WITH CONSULT" above.

Wiring Diagram

INFOID:0000000005448321

EC-KS-01



MBWA1289E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W W	Knock sensor (Bank 1) Knock sensor (Bank 2)	[Engine is running] • Idle speed	Approximately 2.5V

Diagnosis Procedure

INFOID:000000005448322

1.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 2.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor (1) harness connector.
 - ⇨: Vehicle front
2. Check harness continuity between ECM terminal 15 and knock sensor (bank1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

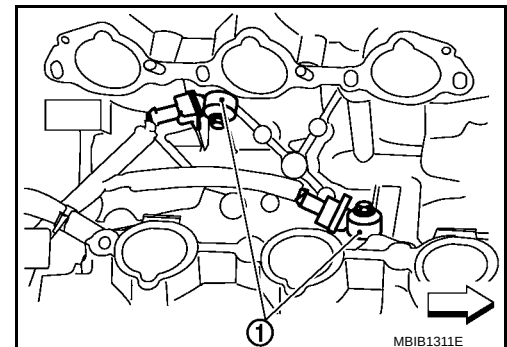
Refer to [EC-240, "Component Inspection"](#).

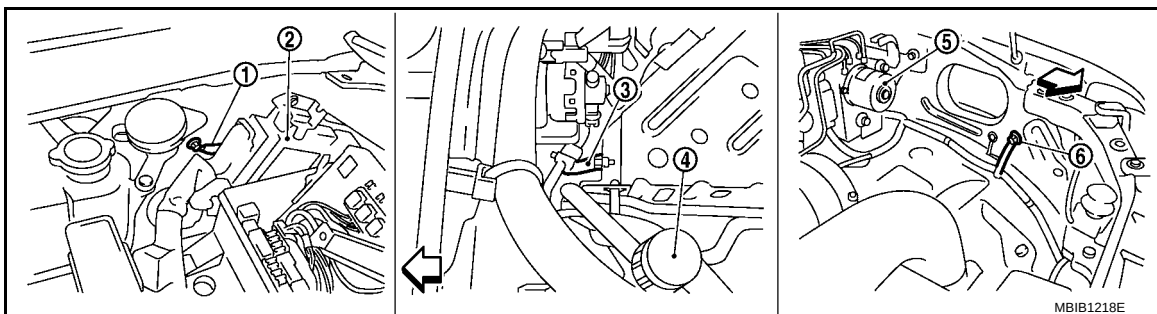
OK or NG

- OK >> GO TO 5.
NG >> Replace knock sensor.

5.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to [EC-147, "Ground Inspection"](#).





↶ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 6.

NG >> Repair or replace ground connections.

6.CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check for short to power.

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness connectors F2, E8
- Harness for open or short between knock sensor and ground

>> Repair open circuit or short power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448323

KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

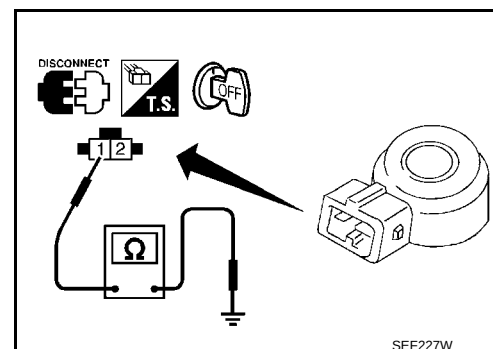
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



SEF227W

Removal and Installation

INFOID:000000005448324

KNOCK SENSOR

Refer to [EM-104](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:000000005448325

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

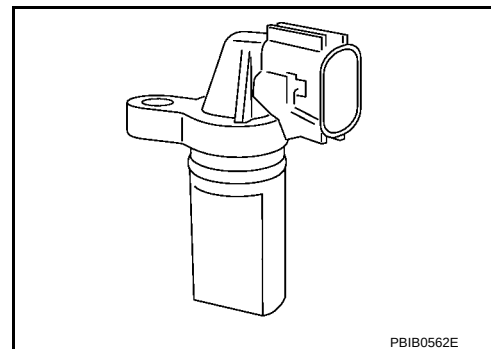
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

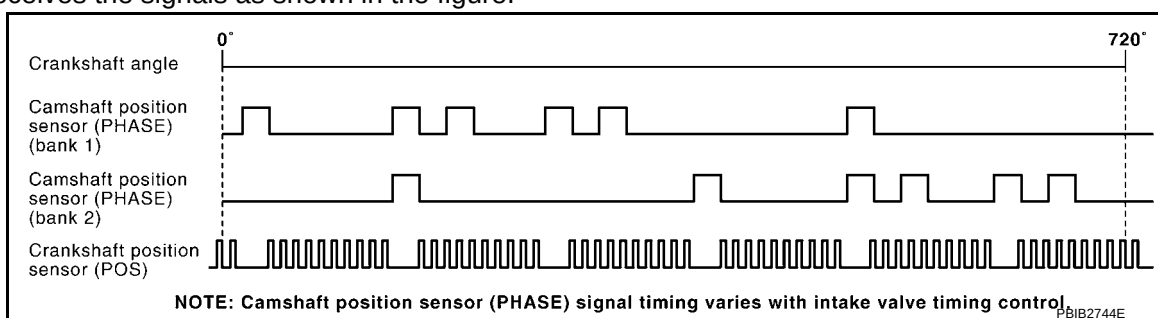
Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



PBIB0562E



PBIB2744E

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448326

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005448327

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	- The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. - The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. - The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	- Harness or connectors (The sensor circuit is open or shorted) - Crankshaft position sensor (POS) - Signal plate

DTC Confirmation Procedure

INFOID:000000005448328

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

DTC P0335 CKP SENSOR (POS)

[VQ TYPE 1]

< SERVICE INFORMATION >

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-244, "Diagnosis Procedure"](#).

 WITH GST

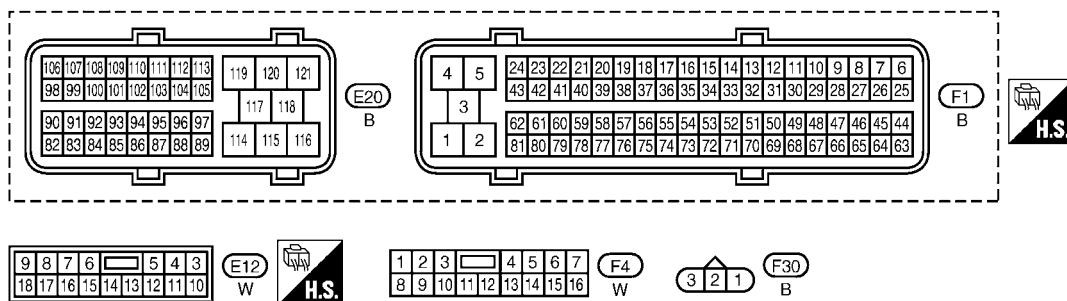
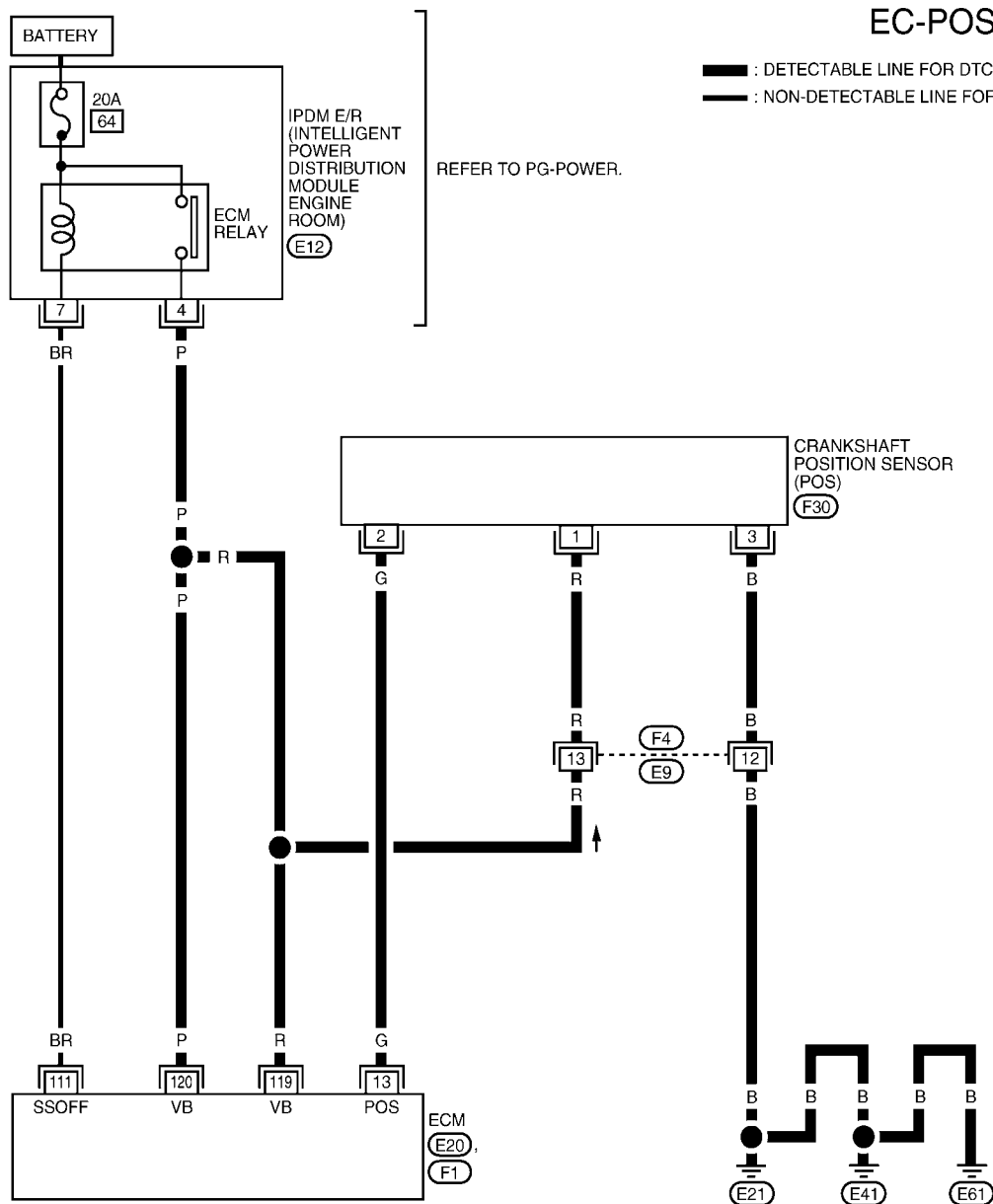
Follow the procedure "WITH CONSULT" above.

Wiring Diagram

INFOID:000000005448329

EC-POS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0425GB

DTC P0335 CKP SENSOR (POS)

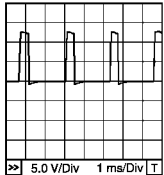
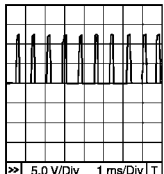
< SERVICE INFORMATION >

[VQ TYPE 1]

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	G	Crankshaft position sensor (POS)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

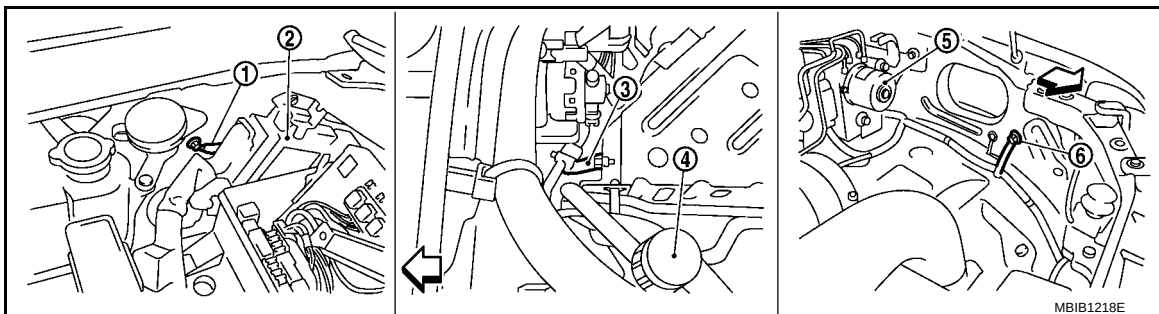
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448330

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



↩ : Vehicle front

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 1]

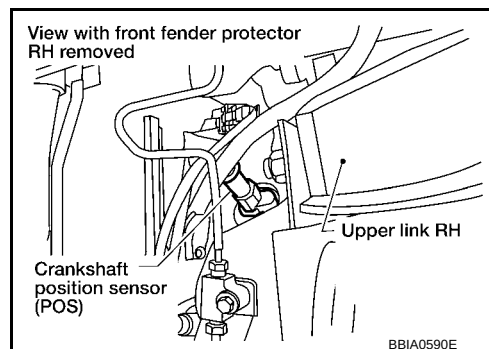
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.

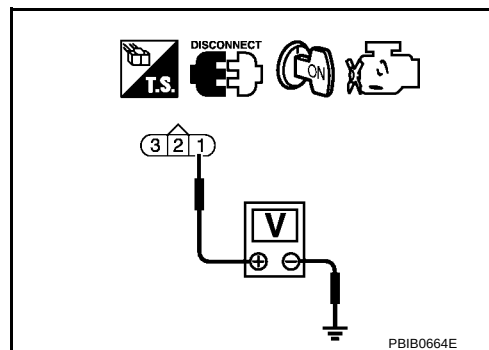


3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ground

>> Repair open circuit or short to power in harness or connectors.

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 1]

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-246. "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.

NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

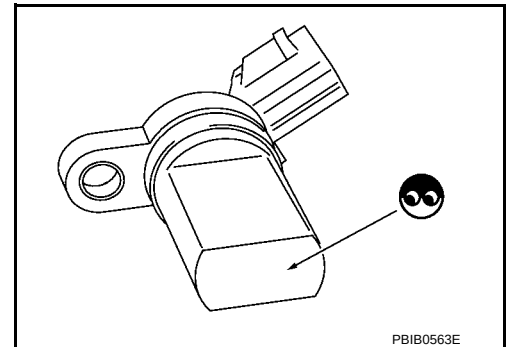
>> INSPECTION END

Component Inspection

INFOID:000000005448331

CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



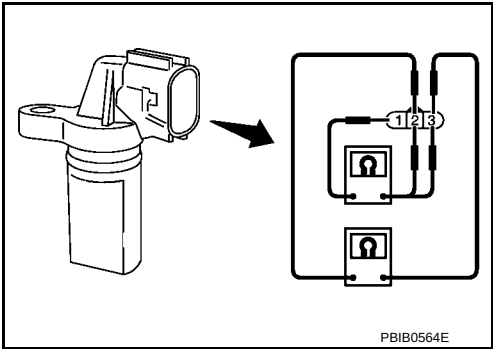
DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 1]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-28](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0340, P0345 CMP SENSOR (PHASE)

Component Description

INFOID:000000005448333

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

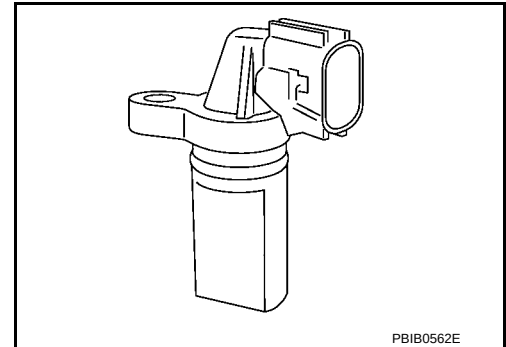
The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

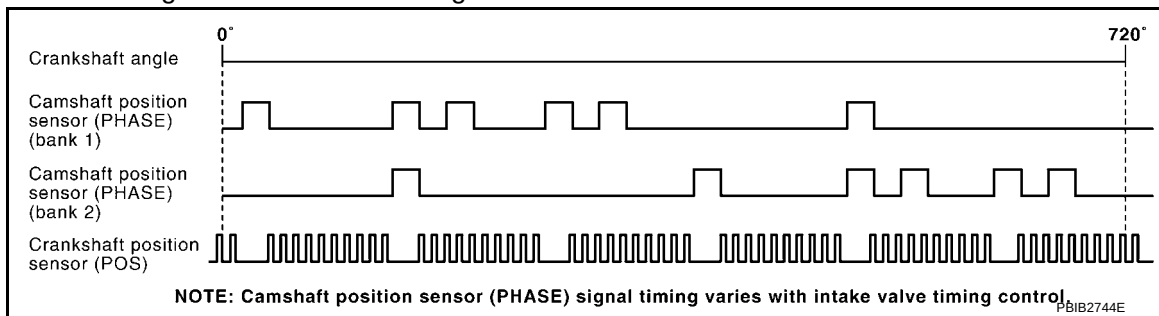
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

ECM receives the signals as shown in the figure.



PBIB0562E



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448334

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005448335

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1)	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (Intake) • Starter motor (Refer to SC-35.) • Starting system circuit (Refer to SC-35.) • Dead (Weak) battery
P0345 0345 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448336

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

④ WITH CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

DTC P0340, P0345 CMP SENSOR (PHASE)

[VQ TYPE 1]

< SERVICE INFORMATION >

2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-253, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
4. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-253, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

A

EC

C

D

E

F

G

H

I

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K

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N

O

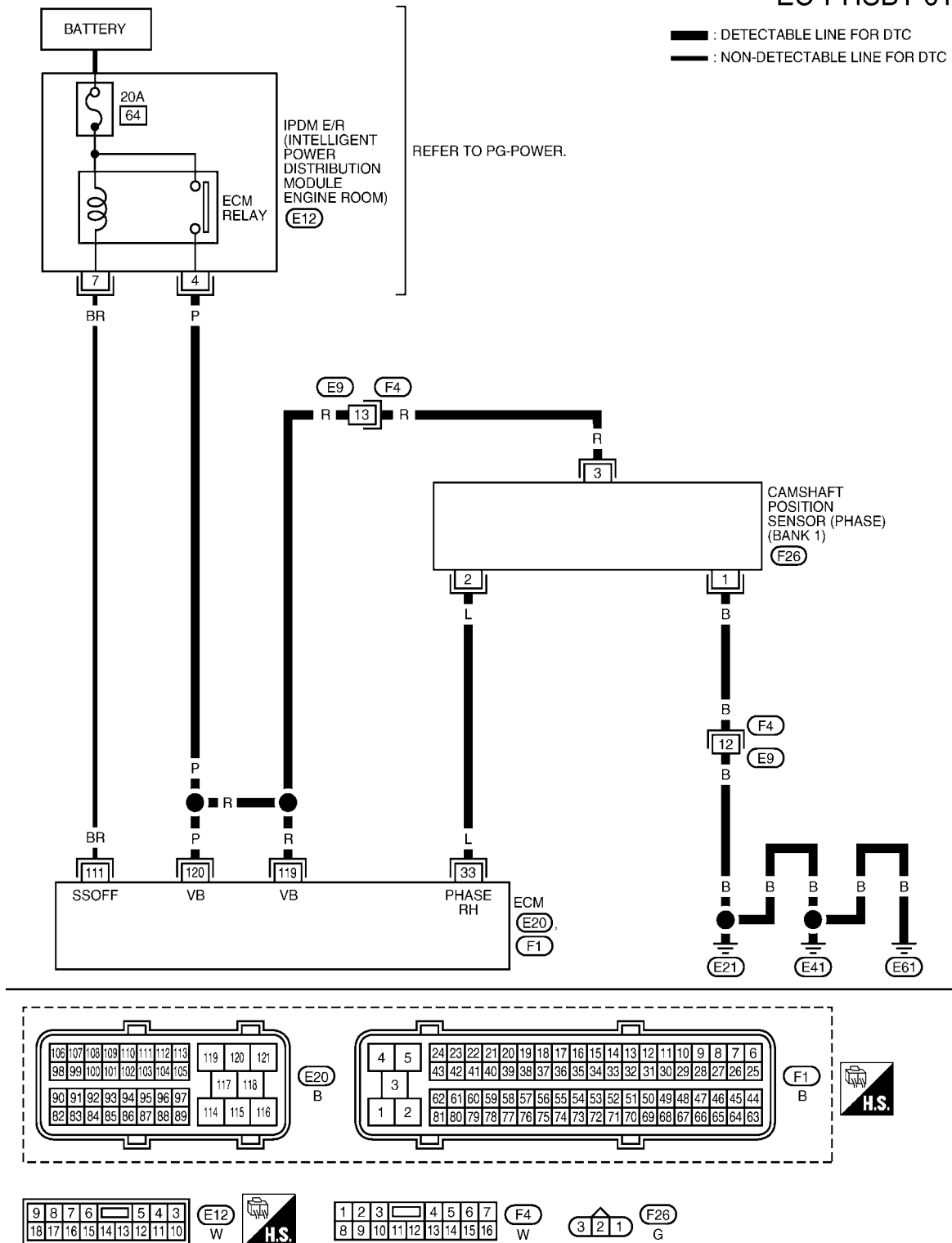
P

[VQ TYPE 1]

Wiring Diagram

BANK 1

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



JMBWA0426GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

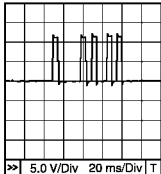
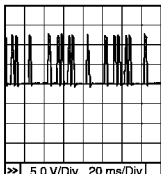
CAUTION:

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

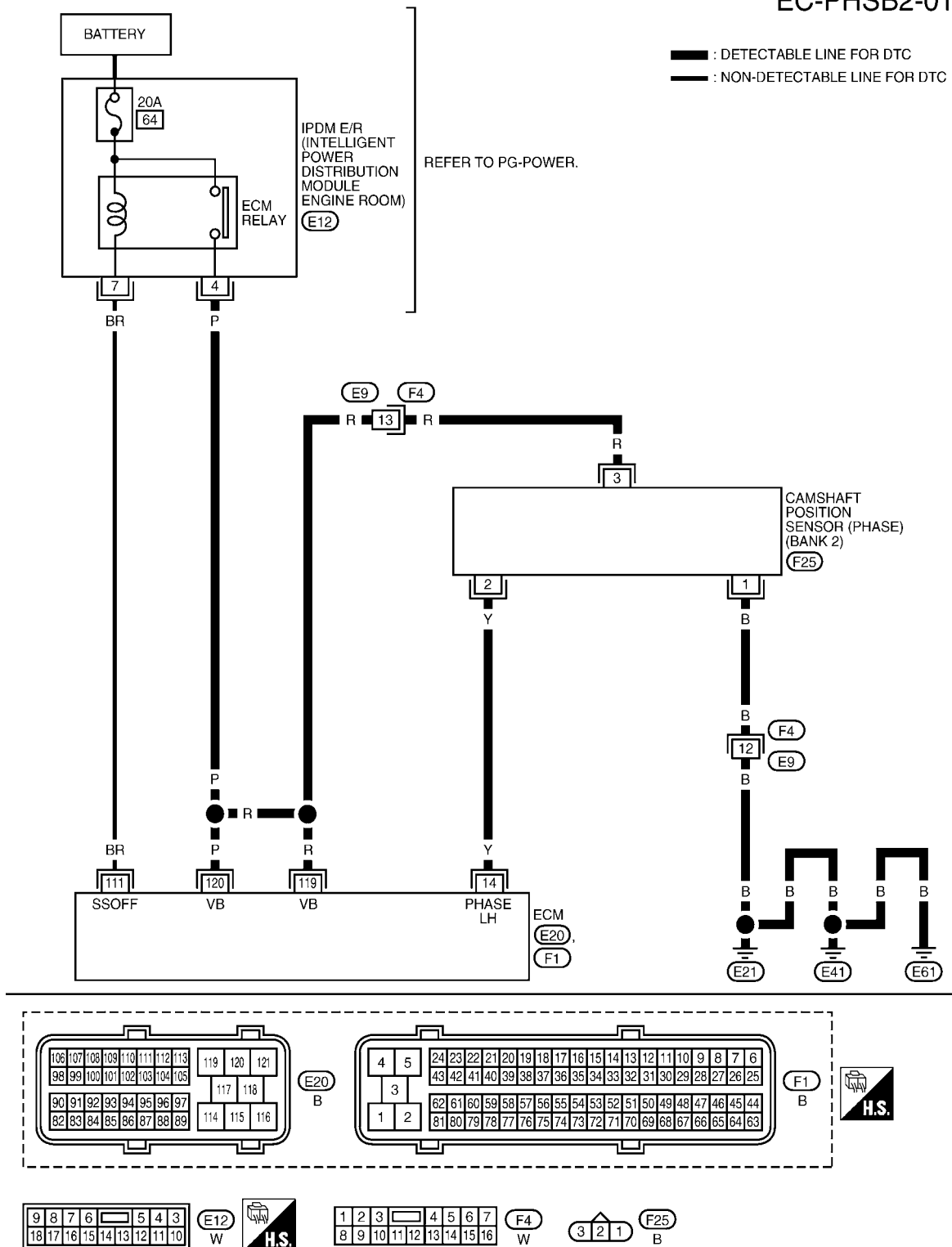
DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-PHSB2-01



JMBWA0427GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

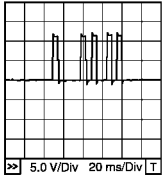
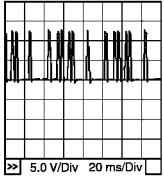
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE) (Bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448338

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

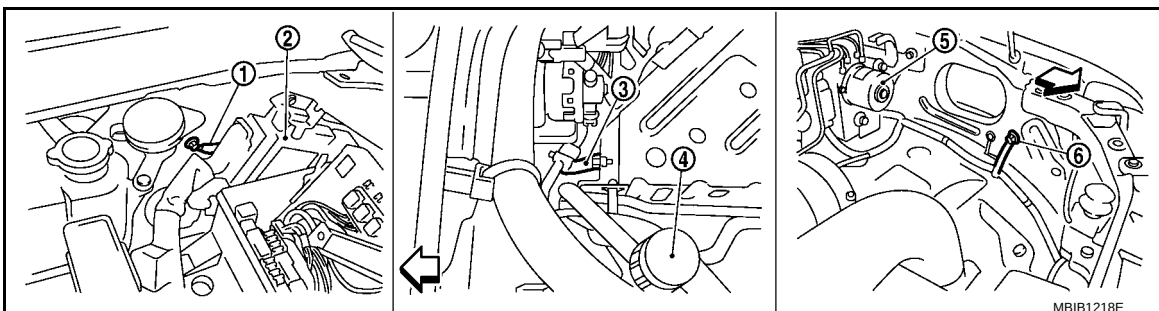
Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-35](#).)

2.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

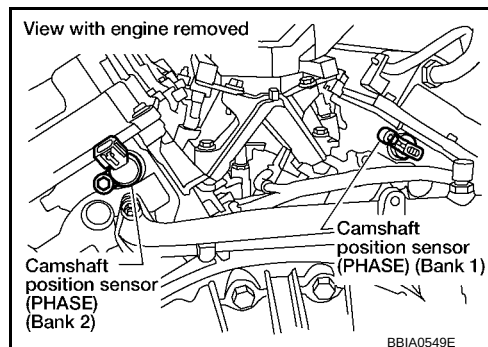
OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



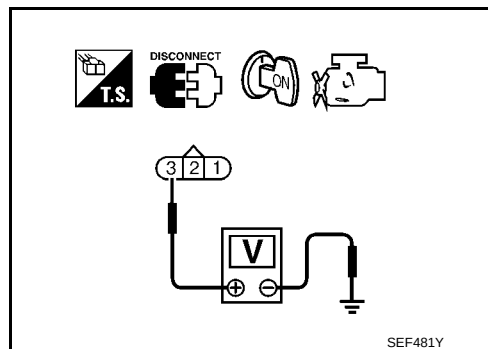
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between CMP sensor (PHASE) and ground

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 1]

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (bank 1) or 14 (bank 2) and CMP sensor (PHASE) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-255, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace camshaft position sensor (PHASE).

9. CHECK CAMSHAFT (INTAKE)

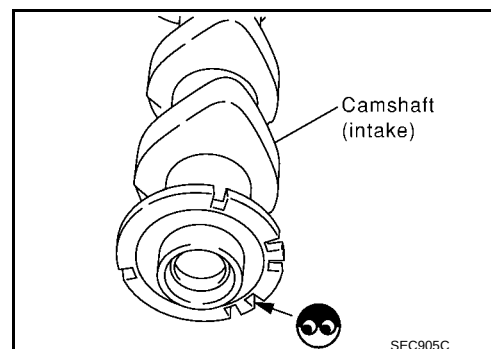
Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

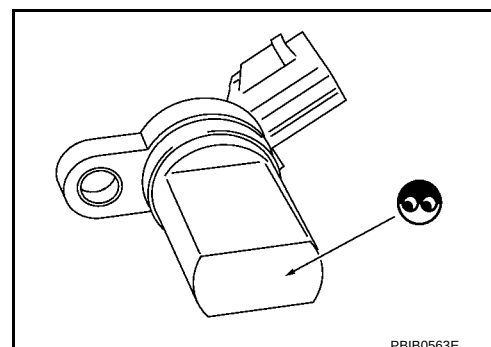
>> **INSPECTION END**

Component Inspection

INFOID:000000005448339

CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



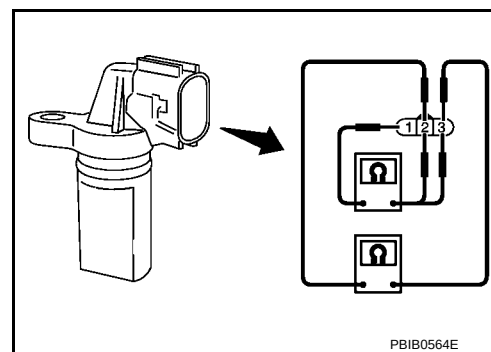
DTC P0340, P0345 CMP SENSOR (PHASE)

[VQ TYPE 1]

< SERVICE INFORMATION >

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EM-71](#).

INFOID:000000005448340

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

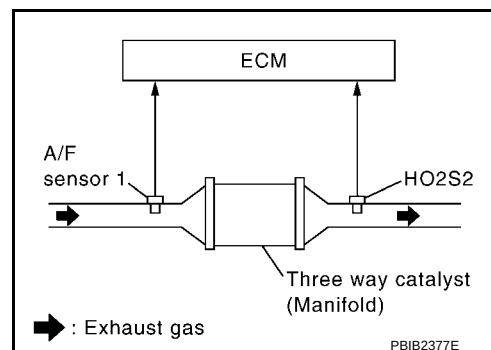
On Board Diagnosis Logic

INFOID:000000005448341

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420 (Bank 1)	Catalyst system efficiency below threshold	- Three way catalyst (manifold) does not operate properly. - Three way catalyst (manifold) does not have enough oxygen storage capacity.	- Three way catalyst (manifold) - Exhaust tube - Intake air leaks - Fuel injector - Fuel injector leaks - Spark plug - Improper ignition timing
P0430 0430 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448342

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- Open engine hood.
- Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.
- Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
If "INCMP" of "CATALYST" changed to "CMPLT", go to step 12.
- Wait 5 seconds at idle.
- Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).
If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
- Select "SELF-DIAG RESULTS" mode with CONSULT.
- Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to [EC-258, "Diagnosis Procedure"](#).

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

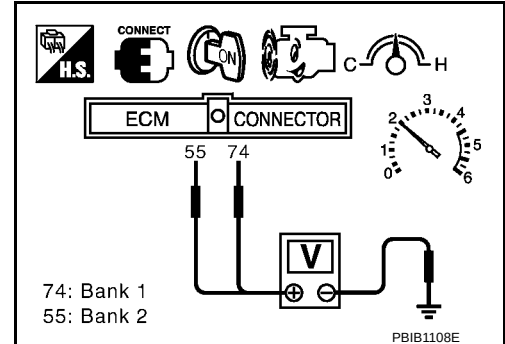
Overall Function Check

INFOID:000000005448343

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 74 [HO2S2 (bank 1) signal], 55 [HO2S2 (bank 2) signal] and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
If the voltage fluctuation cycle takes less than 5 seconds, go to [EC-258, "Diagnosis Procedure"](#).
 - 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Diagnosis Procedure

INFOID:000000005448344

1.CHECK EXHAUST SYSTEM

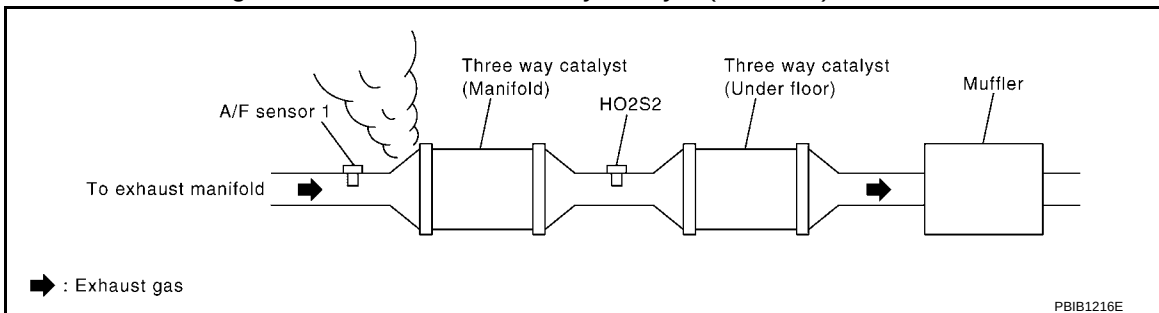
Visually check exhaust tubes and muffler for dent.

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK IGNITION TIMING

Check the following items. Refer to [EC-76, "Basic Inspection"](#).

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

Items	Specifications
Target idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.

NG >> Follow the [EC-76, "Basic Inspection"](#).

5.CHECK FUEL INJECTOR

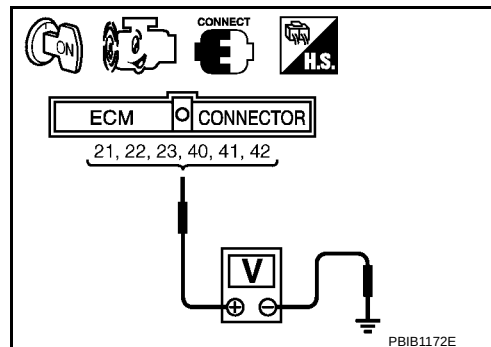
1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42 and ground with CONSULT or tester.
Refer to Wiring Diagram for fuel injectors, [EC-489](#).

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> Perform [EC-490, "Diagnosis Procedure"](#).



6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for five seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

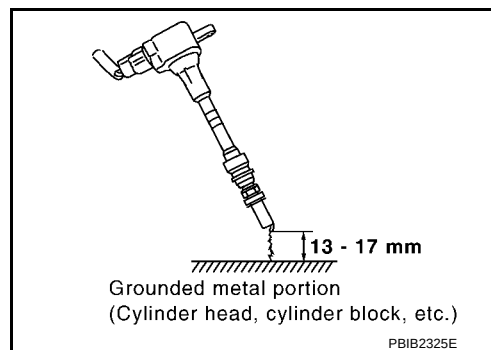
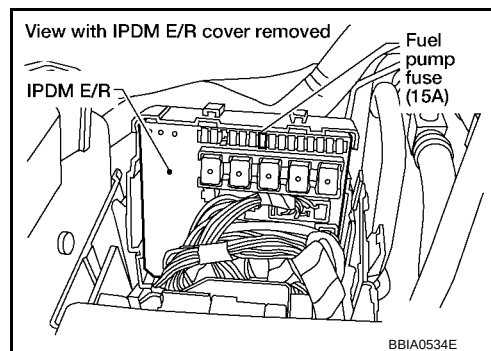
Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.



DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

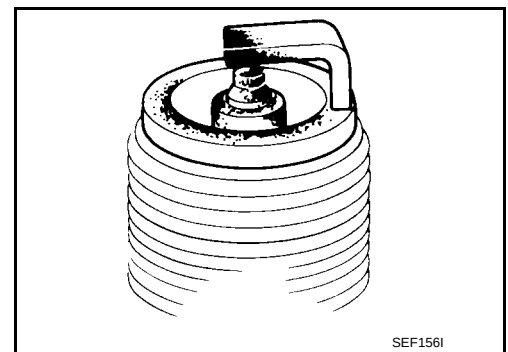
- OK >> GO TO 8.
- NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-499](#).

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

- OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-34, "Changing Spark Plugs \(Platinum-Tipped Type\)"](#).
- NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

- OK >> **INSPECTION END**
- NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-34, "Changing Spark Plugs \(Platinum-Tipped Type\)"](#).

10.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel tube assembly.
Refer to [EM-36](#).
Keep fuel hose and all fuel injectors connected to fuel tube.
3. Reconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Turn ignition switch ON.
Make sure fuel does not drip from fuel injector.

OK or NG

- OK (Does not drip.)>>GO TO 11.
- NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

- Trouble is fixed.>>**INSPECTION END**
- Trouble is not fixed.>>Replace three way catalyst (manifold).

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005448345

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ¹		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor	Vehicle speed* ²		

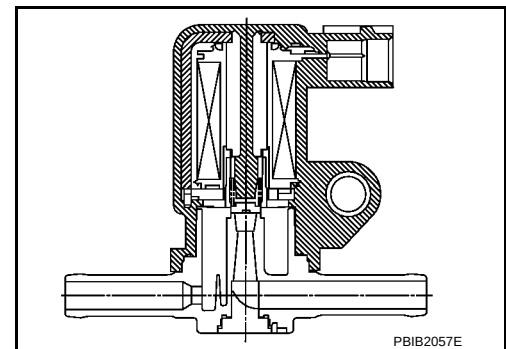
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448346

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

On Board Diagnosis Logic

INFOID:000000005448347

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

INFOID:000000005448348

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-264. "Diagnosis Procedure"](#).

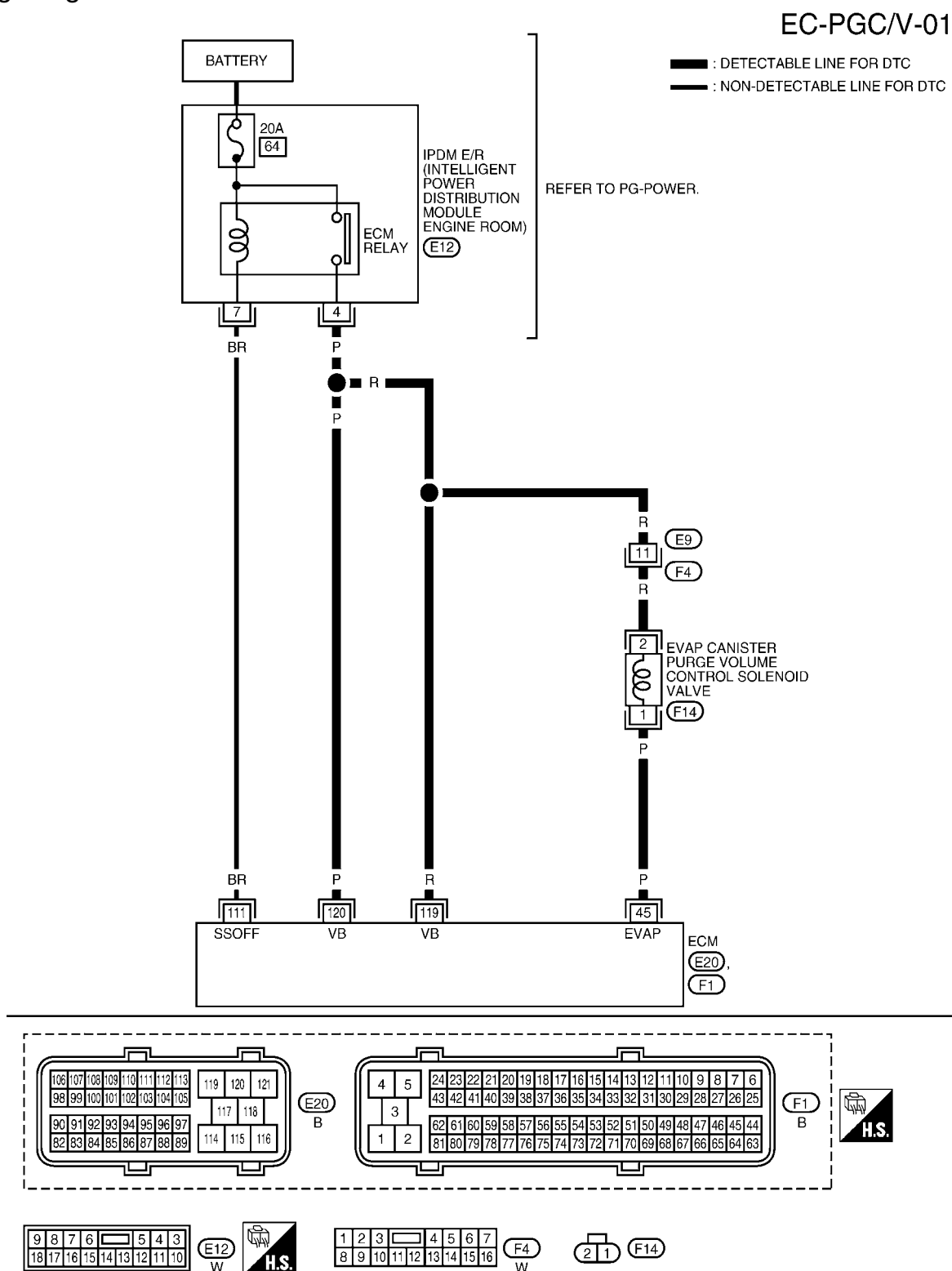
WITH GST

Follow the procedure "WITH CONSULT" above.

[VQ TYPE 1]

< SERVICE INFORMATION >

Wiring Diagram



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

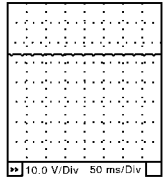
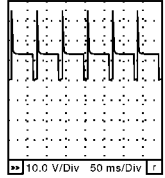
CAUTION:

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

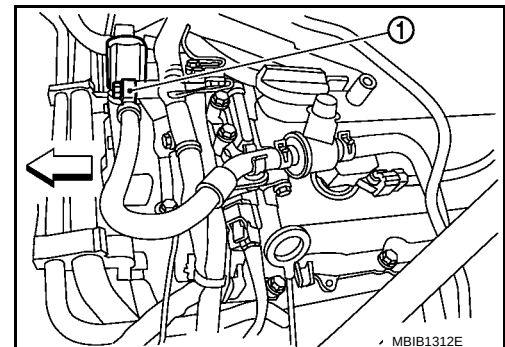
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448350

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
- Turn ignition switch ON.



DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VQ TYPE 1]

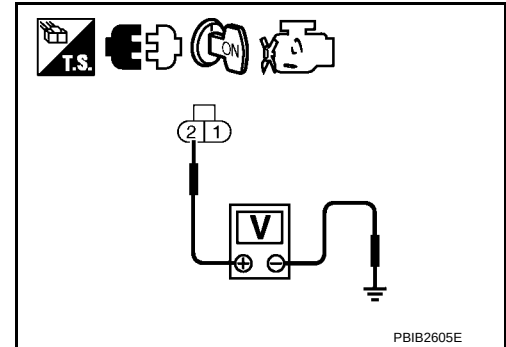
< SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK (With CONSULT)>>GO TO 4.
- OK (Without CONSULT)>>GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-266. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace EVAP canister purge volume control solenoid valve.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

Component Inspection

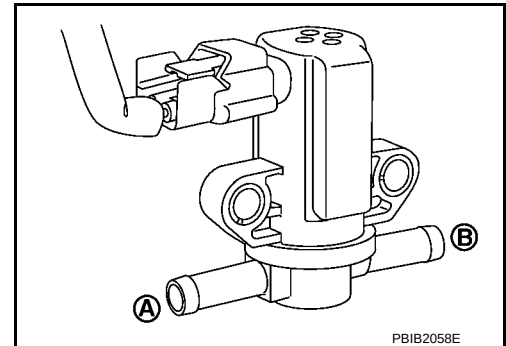
INFOID:000000005448351

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

① With CONSULT

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

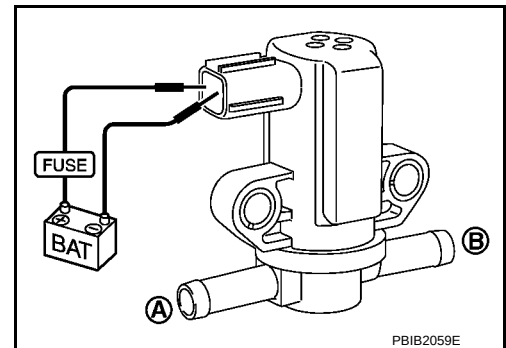
Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No



② Without CONSULT

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:000000005448352

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-18](#).

DTC P0500 VSS

Description

INFOID:000000005448353

NOTE:

If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

On Board Diagnosis Logic

INFOID:000000005448354

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode.

Detected item	Engine operating condition in fail-safe mode
Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (High) while engine is running.

DTC Confirmation Procedure

INFOID:000000005448355

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

 WITH CONSULT

1. Start engine.
2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to [EC-268, "Diagnosis Procedure"](#).
If OK, go to following step.
3. Warm engine up to normal operating temperature.
4. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,700 - 6,000 rpm (A/T) 1,600 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.3 - 31.8 msec (A/T) 6.5 - 31.8 msec (M/T)

DTC P0500 VSS

< SERVICE INFORMATION >

[VQ TYPE 1]

Selector lever	Except P or N position (A/T) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

5. Check 1st trip DTC.

6. If 1st trip DTC is detected, go to [EC-268, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:0000000005448356

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service \$01 with GST.
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to [EC-268, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000005448357

1.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-10, "Fail-Safe Function"](#).

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER FUNCTION

Refer to [DI-4](#).

>> **INSPECTION END**

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

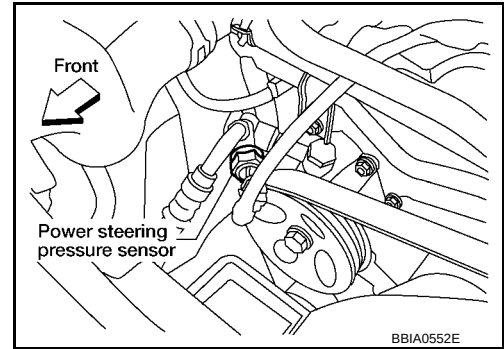
[VQ TYPE 1]

DTC P0550 PSP SENSOR

Component Description

INFOID:000000005448358

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448359

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned.	OFF
		Steering wheel: Being turned.	ON

On Board Diagnosis Logic

INFOID:000000005448360

The MIL will not light up for this diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-344](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Power steering pressure sensor

DTC Confirmation Procedure

INFOID:000000005448361

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-271, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

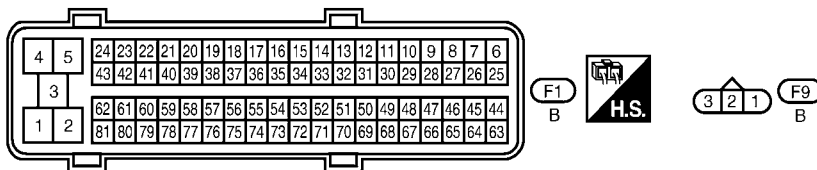
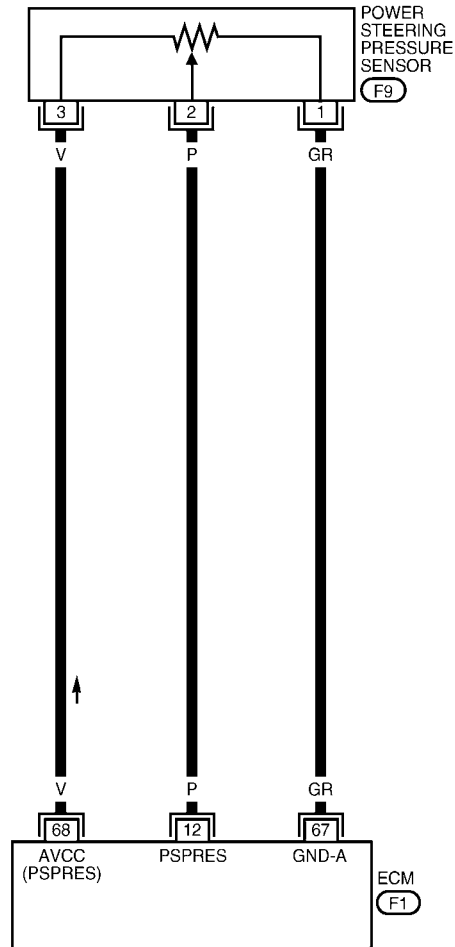
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448362

EC-PS/SEN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1296E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

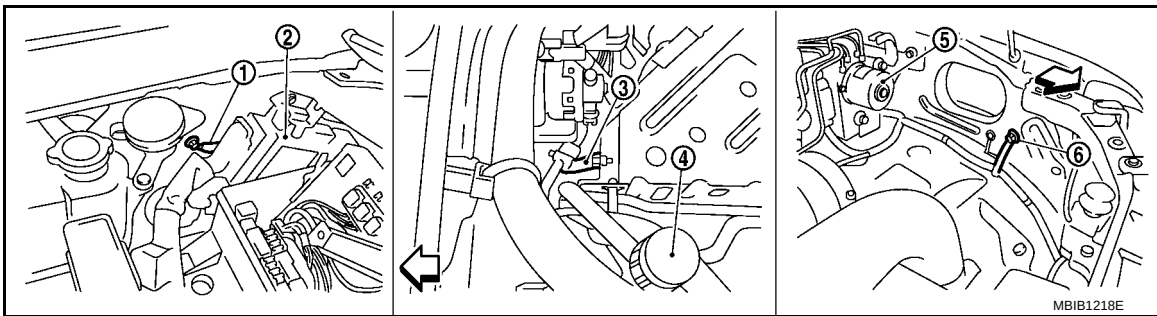
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448363

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

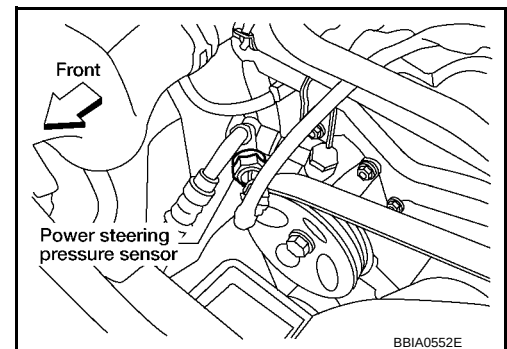
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

- Disconnect PSP sensor harness connector.
- Turn ignition switch ON.



DTC P0550 PSP SENSOR

[VQ TYPE 1]

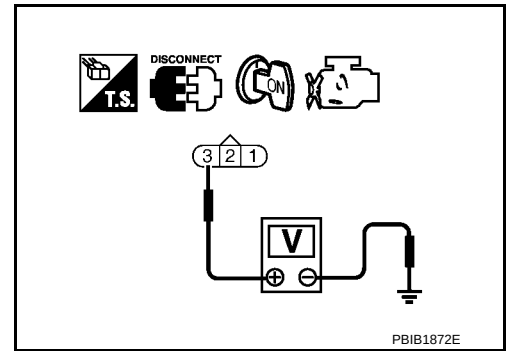
< SERVICE INFORMATION >

3. Check voltage between PSP sensor terminal 3 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to [EC-272, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448364

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.

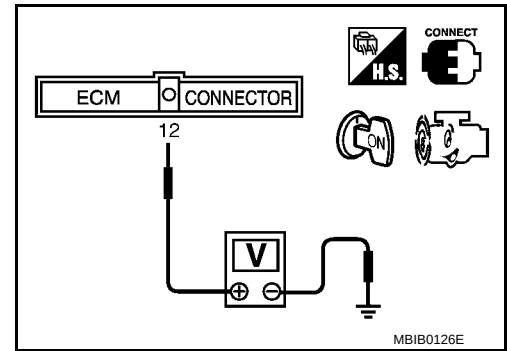
DTC P0550 PSP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned.	0.5 - 4.5V
Steering wheel: Not being turned.	0.4 - 0.8V



INFOID:000000005448365

Removal and Installation

POWER STEERING PRESSURE SENSOR

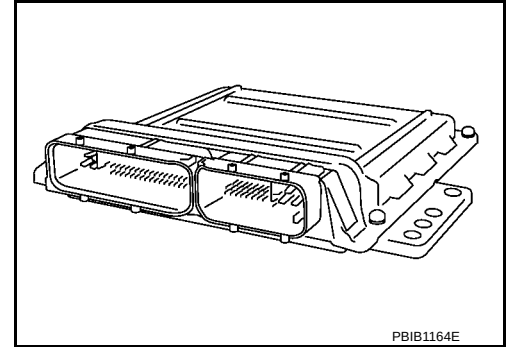
Refer to [PS-40](#).

DTC P0605 ECM

Component Description

INFOID:000000005448366

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



PBIB1164E

On Board Diagnosis Logic

INFOID:000000005448367

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	- ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. - ECM deactivates ASCD operation.

DTC Confirmation Procedure

INFOID:000000005448368

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-275, "Diagnosis Procedure"](#).

With GST

Follow the procedure "With CONSULT" above.

PROCEDURE FOR MALFUNCTION B

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-275, "Diagnosis Procedure"](#).

With GST

< SERVICE INFORMATION >

Follow the procedure "With CONSULT" above.

PROCEDURE FOR MALFUNCTION C

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-275, "Diagnosis Procedure"](#).

With GST

Follow the procedure "With CONSULT" above.

Diagnosis Procedure

INFOID:000000005448369

1.INSPECTION START

With CONSULT

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-274, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**
See [EC-274, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.

No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
3. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

Description

INFOID:000000005448370

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the air fuel ratio (A/F) sensor 1 heater corresponding to the engine operating condition to keep the temperature of air fuel ratio (A/F) sensor 1 element at the specified range.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448371

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	• Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

INFOID:000000005448372

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1) P1051 1051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 heater
P1032 1032 (Bank 1) P1052 1052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is shorted.) • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

INFOID:000000005448373

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-280. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

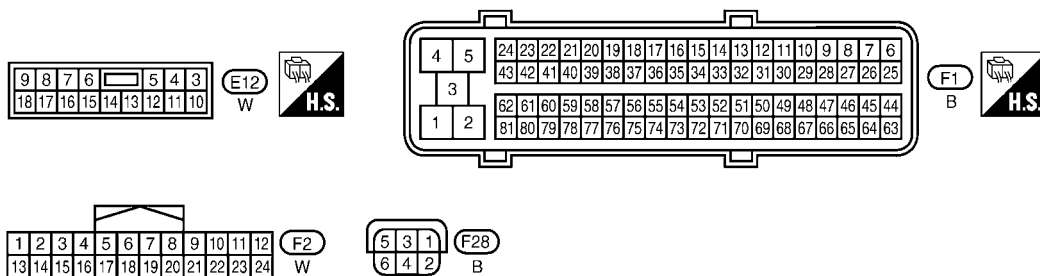
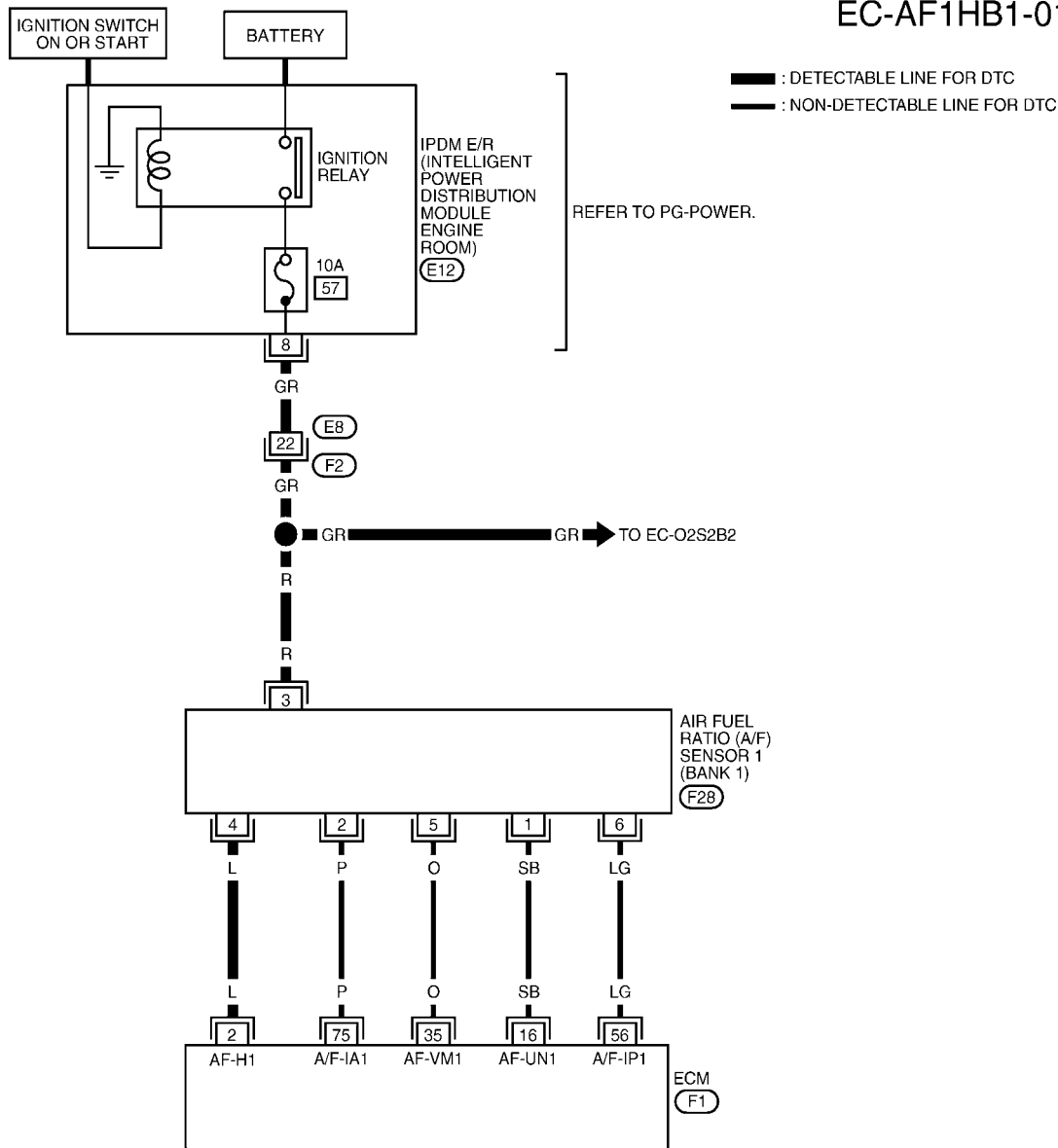
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448374

BANK 1

EC-AF1HB1-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

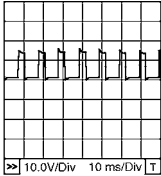
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★ 
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

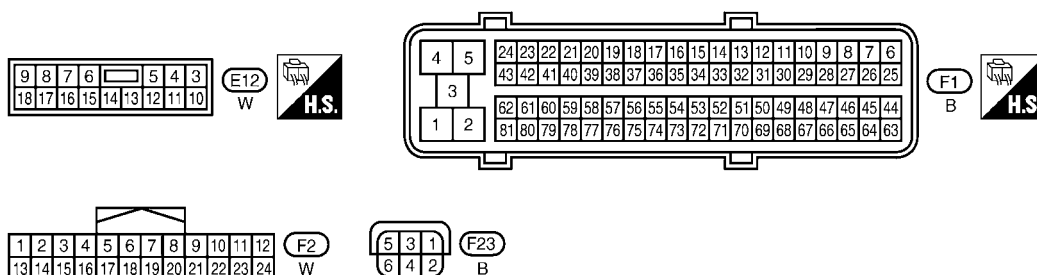
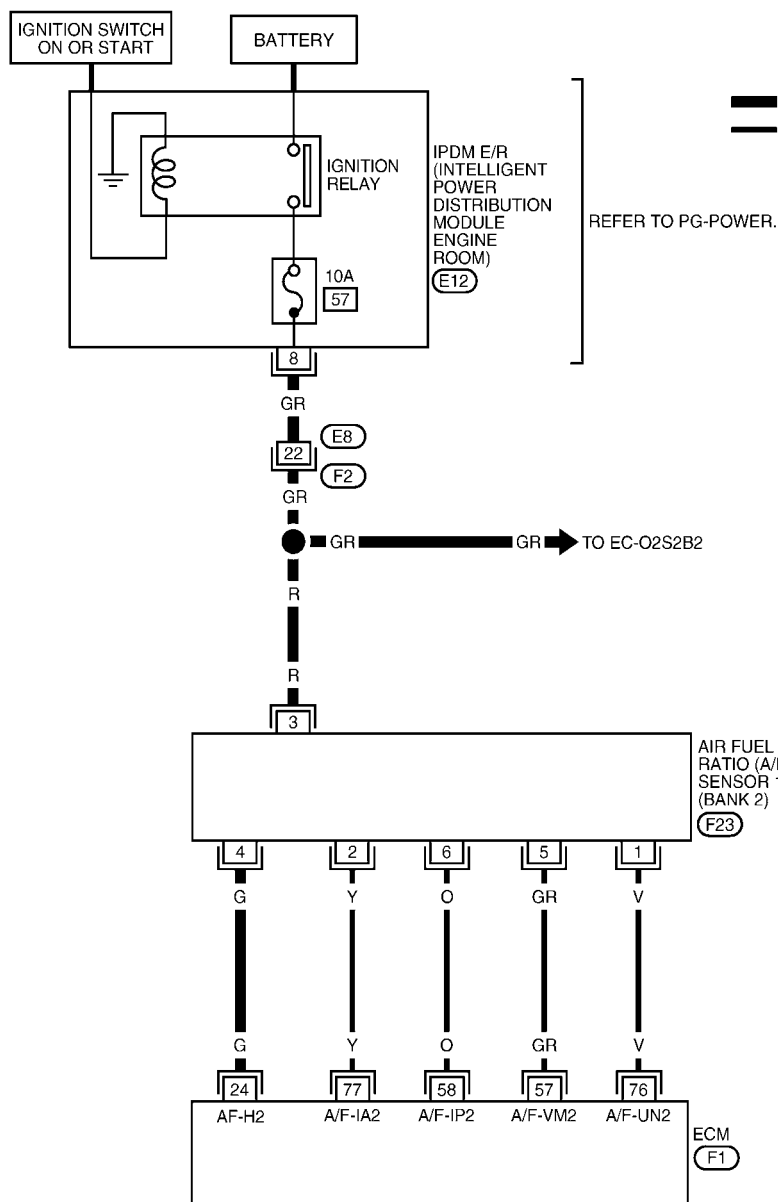
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1HB2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

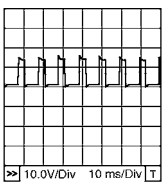
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

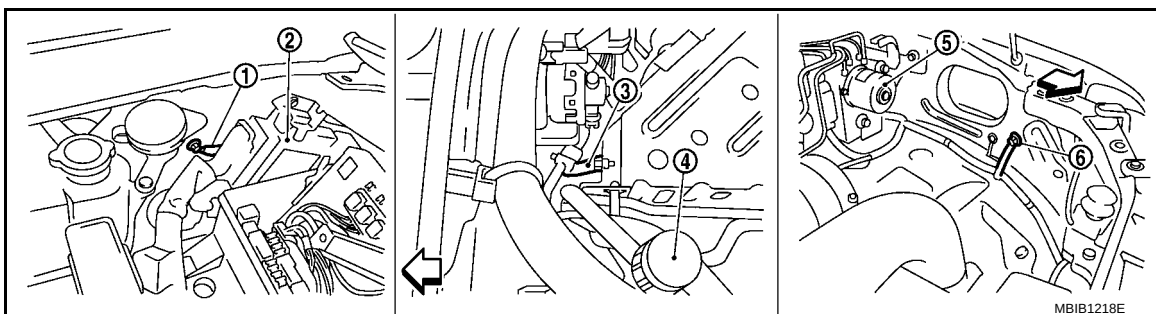
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448375

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

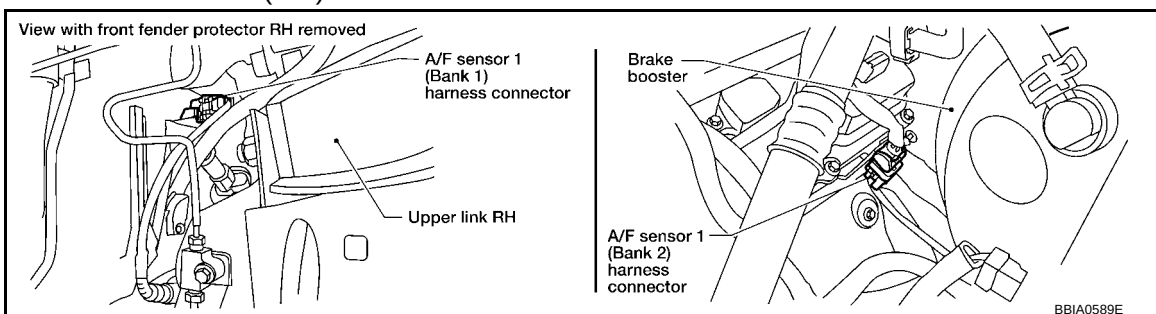
OK or NG

OK >> GO TO 2.

NG >> Repair or Replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.



- Turn ignition switch ON.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

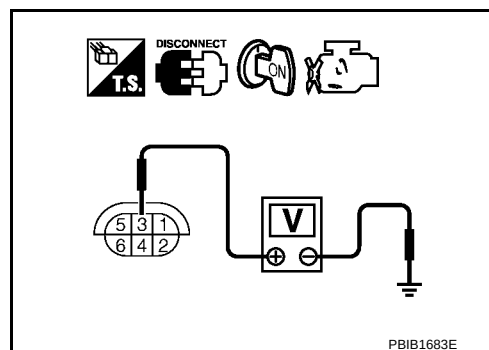
[VQ TYPE 1]

3. Check voltage between air fuel ratio sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 4.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-282. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> GO TO 7.

6.CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

- OK >> GO TO 7.
NG >> Repair or replace.

7.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 1]

Component Inspection

INFOID:000000005448376

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω [at 25°C (77°F)]

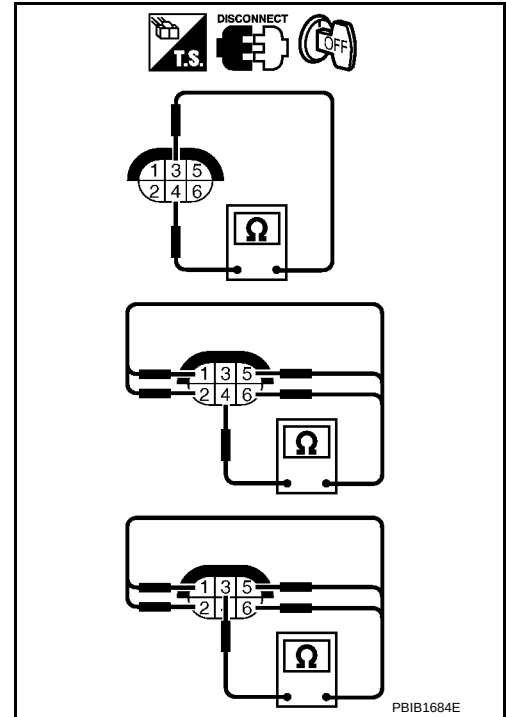
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.



Removal and Installation

INFOID:000000005448377

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

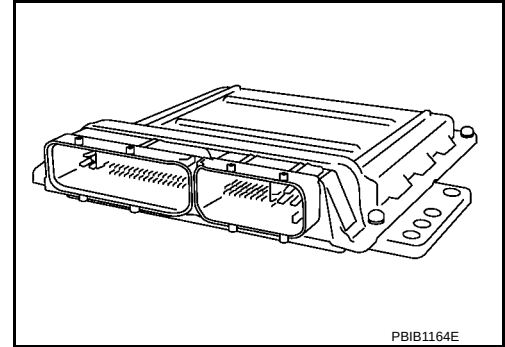
[VQ TYPE 1]

DTC P1065 ECM POWER SUPPLY

Component Description

INFOID:000000005448378

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



PBIB1164E

On Board Diagnosis Logic

INFOID:000000005448379

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

INFOID:000000005448380

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for 4 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-285, "Diagnosis Procedure"](#).

⑧ WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

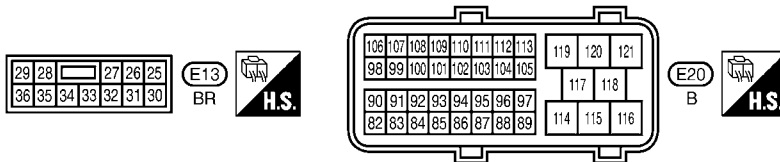
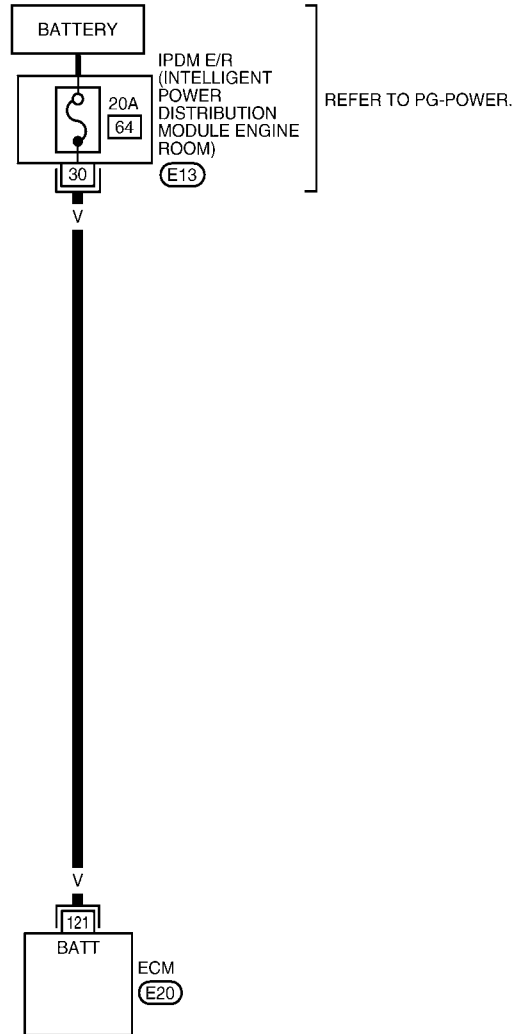
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448381

EC-ECM/PW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0431GB

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	V	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448382

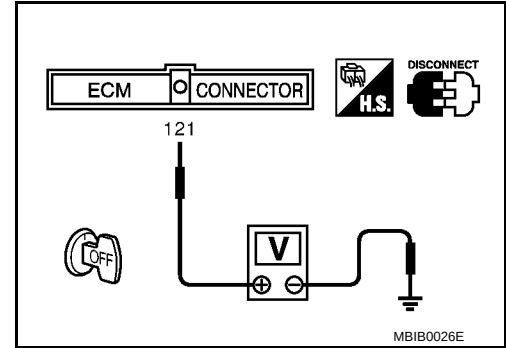
1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2.DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- IPDM E/R harness connector E13
- Harness for open or short between ECM and battery

>> Repair open circuit in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-283, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**
See [EC-283, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

- Yes >> GO TO 5.
No >> **INSPECTION END**

5.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).

DTC P1065 ECM POWER SUPPLY

[VQ TYPE 1]

< SERVICE INFORMATION >

3. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:000000005448383

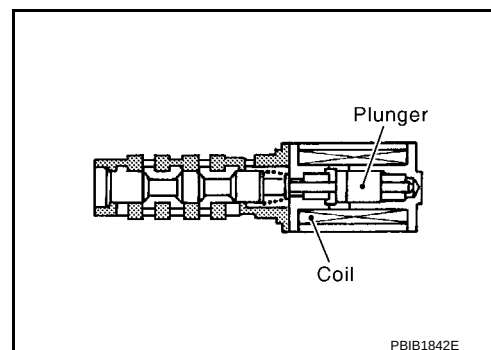
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448384

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

INFOID:000000005448385

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111 (Bank 1)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	- Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) - Intake valve timing control solenoid valve
P1136 1136 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448386

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

- Start engine and let it idle for 5 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-291, "Diagnosis Procedure"](#).

WITH GST

Following the procedure "WITH CONSULT" above.

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

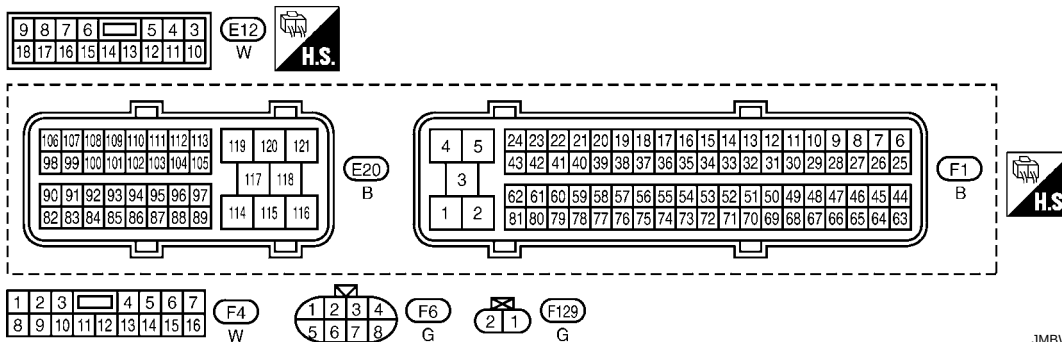
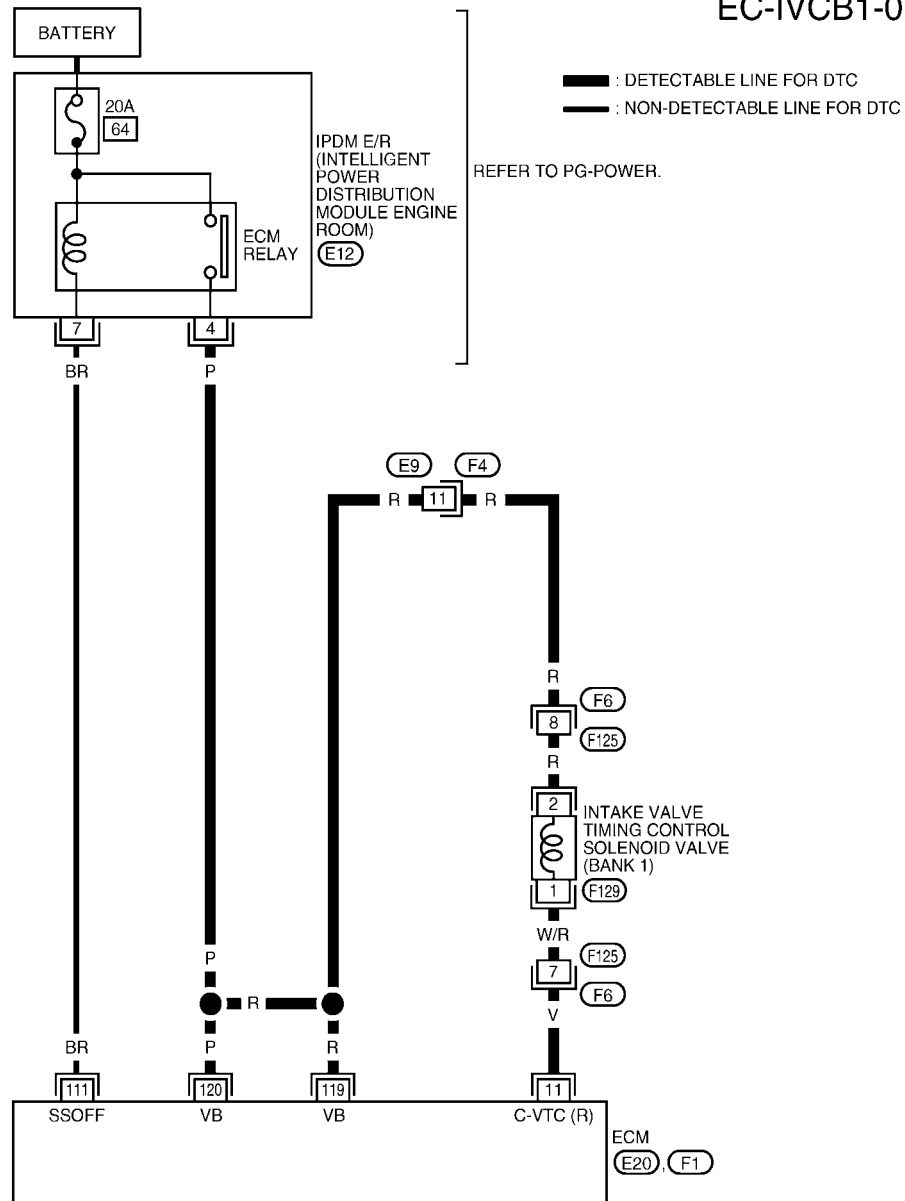
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448387

BANK 1

EC-IVCB1-01



JMBWA0432GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

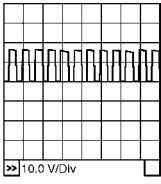
CAUTION:

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

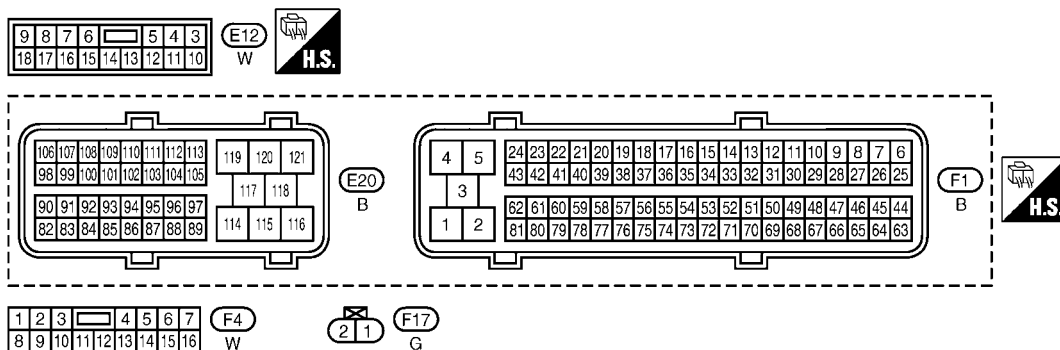
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★ 
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

[VQ TYPE 1]

EC-IVCB2-01

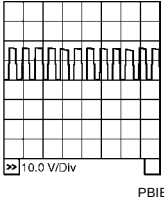


EC-290

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★ 
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

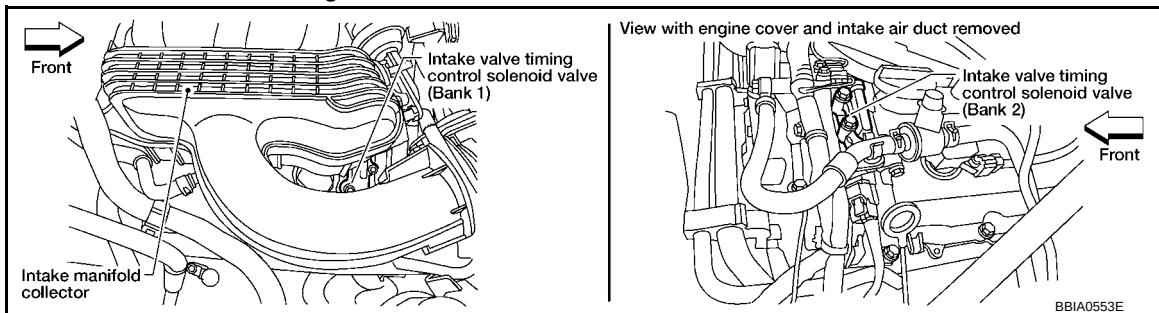
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448388

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve harness connector.

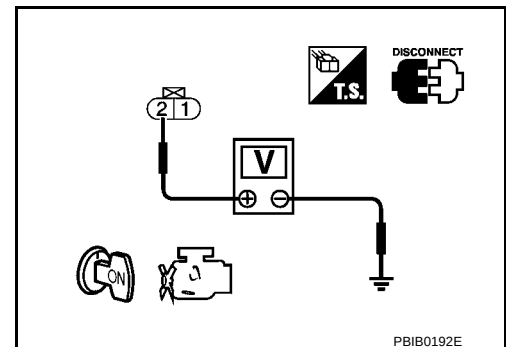


- Turn ignition switch ON.
- Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F6, F125 (bank 1)

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R
- Harness for open or short between intake valve timing control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6 (bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-292, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace intake valve timing control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448389

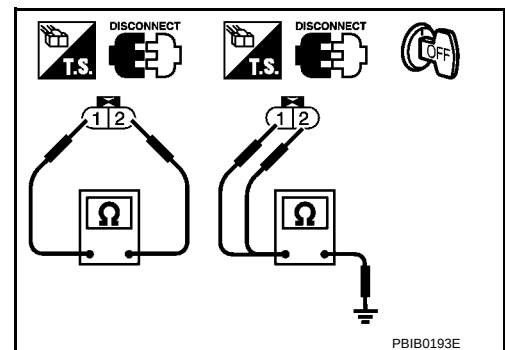
INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	$\infty\Omega$ (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.



DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

[VQ TYPE 1]

< SERVICE INFORMATION >

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

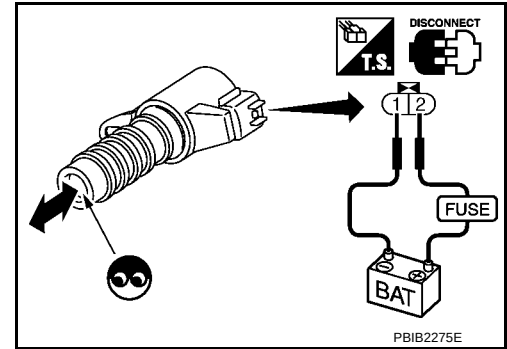
CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



INFOID:000000005448390

Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:000000005448391

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448392

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:000000005448393

NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Shift selector lever to P position (A/T) or neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
7. Shift selector lever to P position (A/T) or neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to [EC-295, "Diagnosis Procedure"](#).

With GST

Follow the procedure "WITH CONSULT" above.

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[VQ TYPE 1]

PROCEDURE FOR MALFUNCTION C

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT.
3. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P or N position (A/T) or neutral position (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to [EC-295, "Diagnosis Procedure"](#).

With GST

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

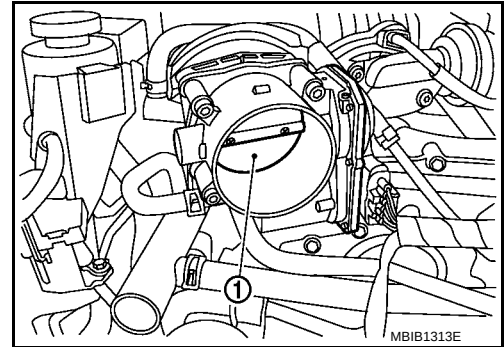
INFOID:000000005448394

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000005448395

NOTE:

If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to [EC-294](#) or [EC-302](#).

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448396

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448397

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V when the engine is running.

WITH CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-298, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

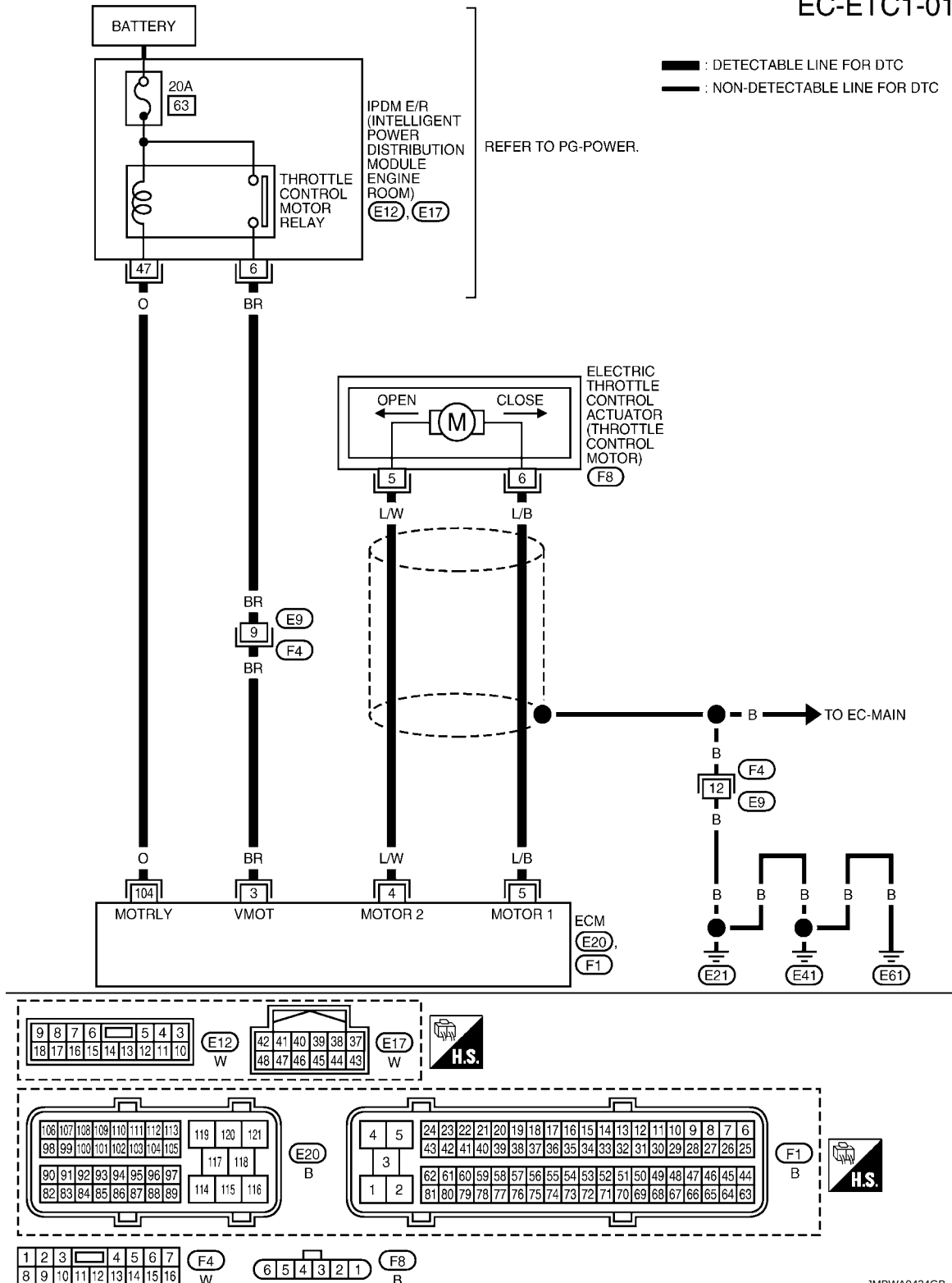
Wiring Diagram

INFOID:000000005448398

EC-ETC1-01

EC

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

CAUTION:

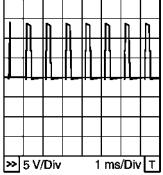
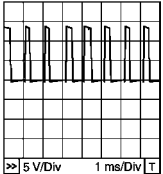
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0434GB

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

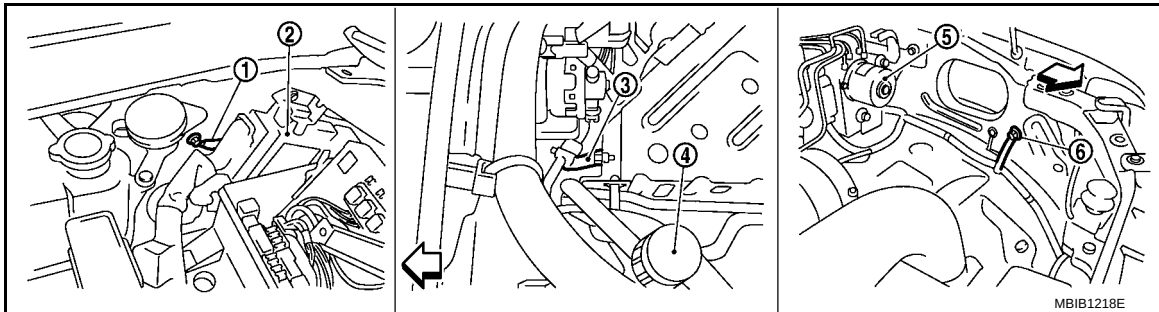
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448399

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↶ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C hi-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[VQ TYPE 1]

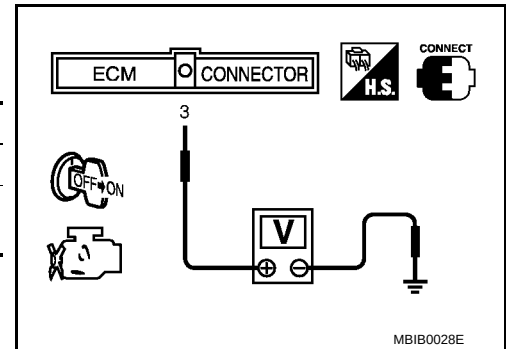
< SERVICE INFORMATION >

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 9.
NG >> GO TO 3.



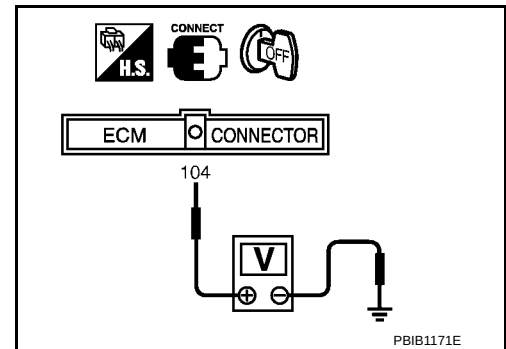
3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 4.



4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 8.
NG >> Replace 20A fuse.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

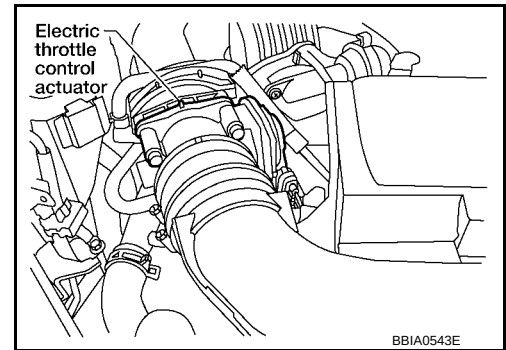
OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist



5. Also check harness for short to ground and short to power.

OK or NG

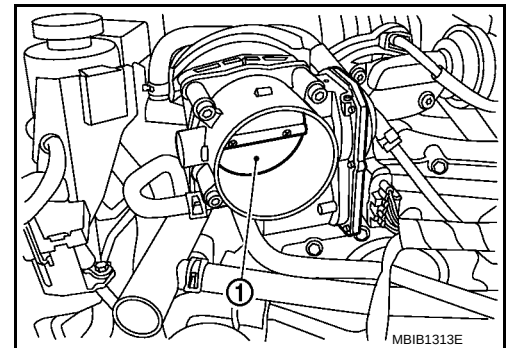
- OK >> GO TO 10.
NG >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 11.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



11. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-301. "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
NG >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> GO TO 13.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[VQ TYPE 1]

< SERVICE INFORMATION >

NG >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

Component Inspection

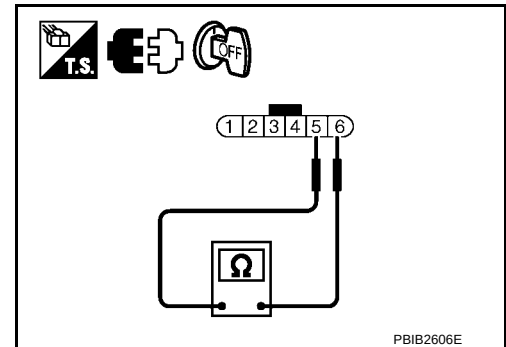
INFOID:000000005448400

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-82, "Idle Air Volume Learning"](#).



INFOID:000000005448401

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:000000005448402

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448403

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:000000005448404

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448405

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-305, "Diagnosis Procedure"](#).

With GST

Follow the procedure "With CONSULT" above.

PROCEDURE FOR DTC P1126

With CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[VQ TYPE 1]

< SERVICE INFORMATION >

2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-305. "Diagnosis Procedure"](#).



With GST

Follow the procedure "With CONSULT" above.

A

EC

C

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P

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

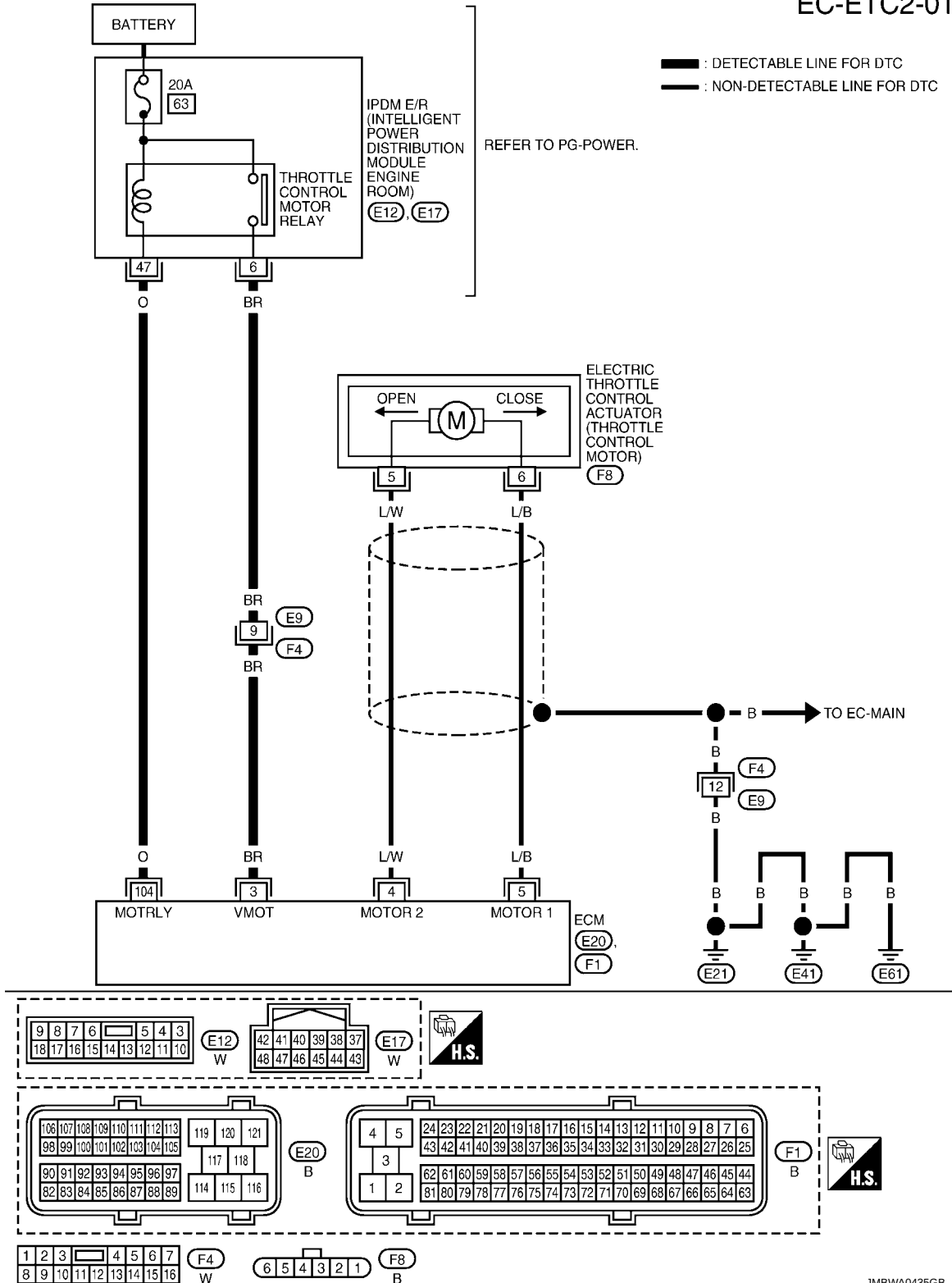
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448406

EC-ETC2-01



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448407

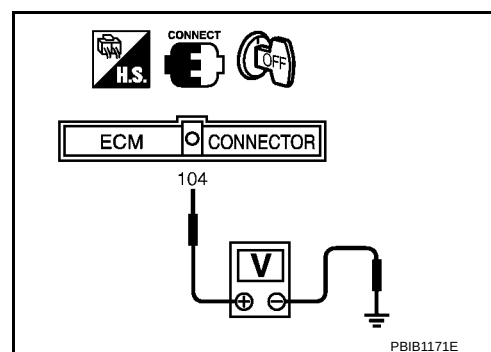
1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Check voltage between ECM terminal 104 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.



2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E17.
- Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUSE

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 7.
NG >> Replace 20A fuse.

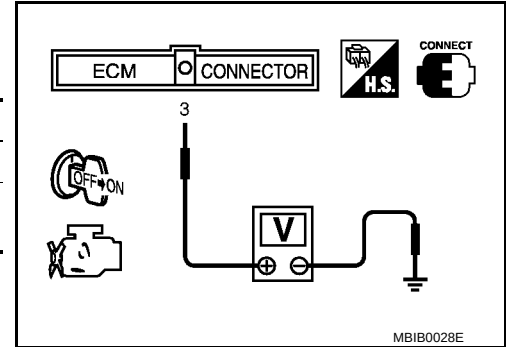
4.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 7.
NG >> GO TO 5.



5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1128 THROTTLE CONTROL MOTOR

Component Description

INFOID:000000005448408

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448409

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448410

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-309, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1128 THROTTLE CONTROL MOTOR

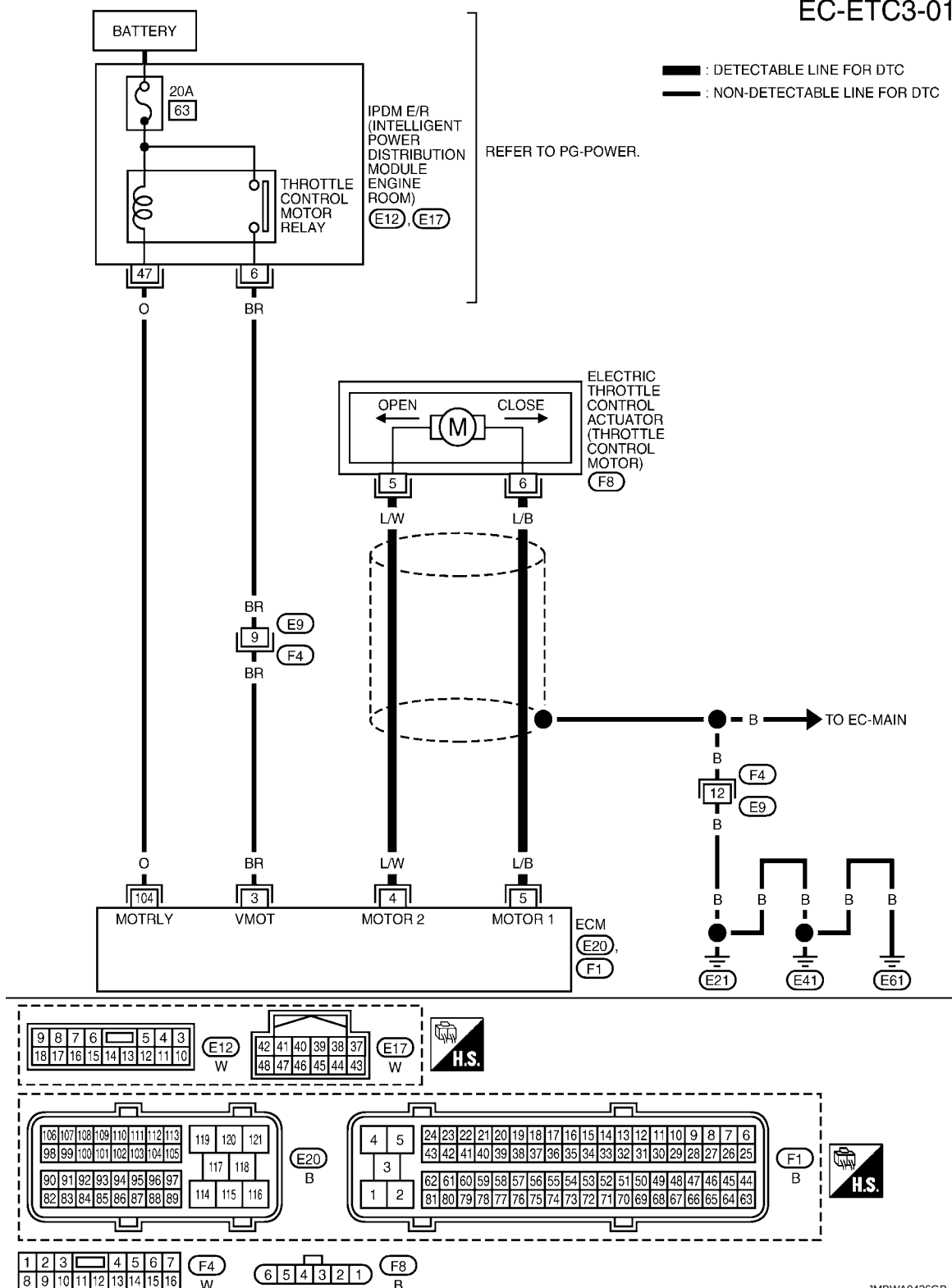
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448411

EC-ETC3-01



JMBWA0436GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1128 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

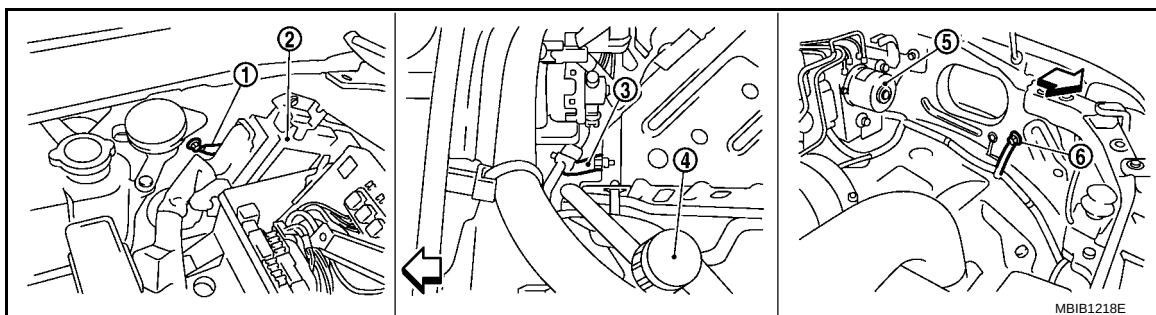
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448412

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C hi-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

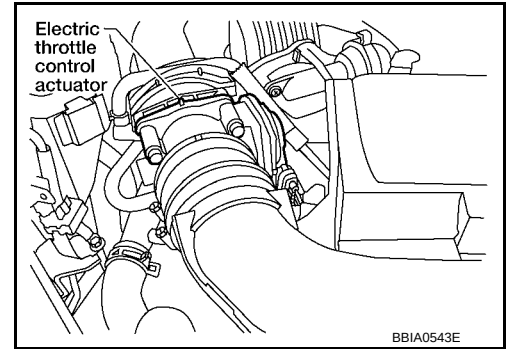
DTC P1128 THROTTLE CONTROL MOTOR

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist



4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to [EC-310, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

Component Inspection

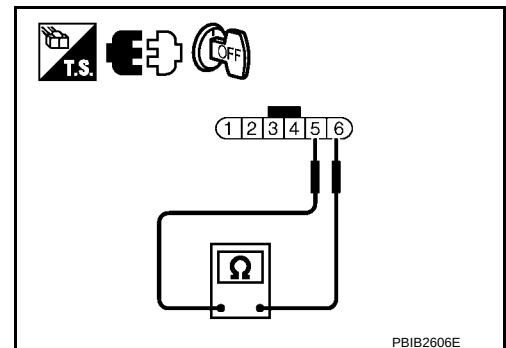
INFOID:000000005448413

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-82, "Idle Air Volume Learning"](#).



Removal and Installation

INFOID:000000005448414

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1146, P1166 HO2S2

Component Description

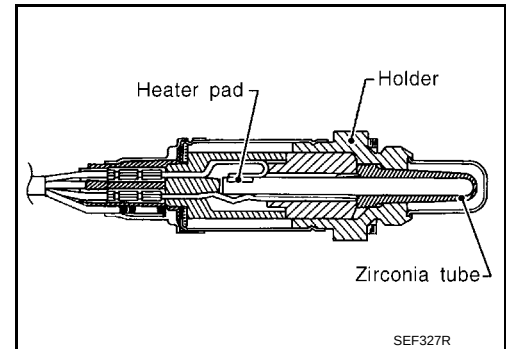
INFOID:000000005448415

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448416

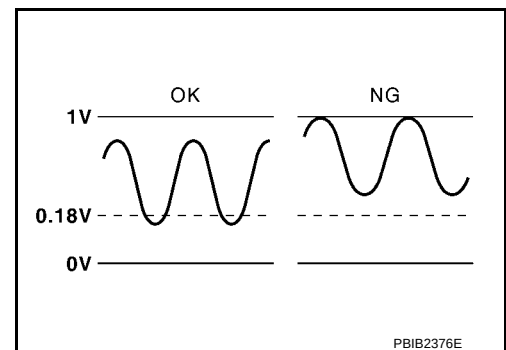
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	Revvng engine from idle to 3,000 rpm quickly after the following conditions are met	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	- Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	LEAN $\longleftrightarrow$ RICH

On Board Diagnosis Logic

INFOID:000000005448417

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146 (Bank 1)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	- Harness or connectors (The sensor circuit is open or shorted) - Heated oxygen sensor 2 - Fuel pressure - Fuel injector
P1166 1166 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448418

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT screen when all tests “COND1”, “COND2” and “COND3” are completed.
- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in Procedure for COND1.

 WITH CONSULT

Procedure for COND1

For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1146” or “HO2S2 (B2) P1166” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
6. Touch “START”.
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
If “COMPLETED” appears on CONSULT screen, go to step 2 in Procedure for COND3.
If “COMPLETED” does not appear on CONSULT screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position

NOTE:

- If “TESTING” is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.
- If “COMPLETED” already appears at “COND2” on CONSULT screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T models only) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

NOTE:

If “COMPLETE” already appears at “COND3” on CONSULT screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.

Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
If “NG” is displayed, refer to [EC-317, “Diagnosis Procedure”](#).
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
 - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 - b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT
 - c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT.
 - d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.

Overall Function Check

INFOID:000000005448419

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

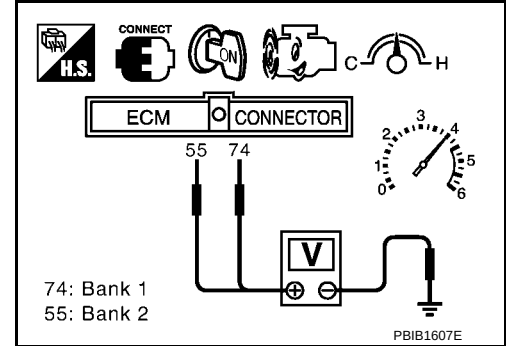
 WITH GST

DTC P1146, P1166 HO2S2

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.18V at least once during this procedure.
If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, go to [EC-317. "Diagnosis Procedure"](#).

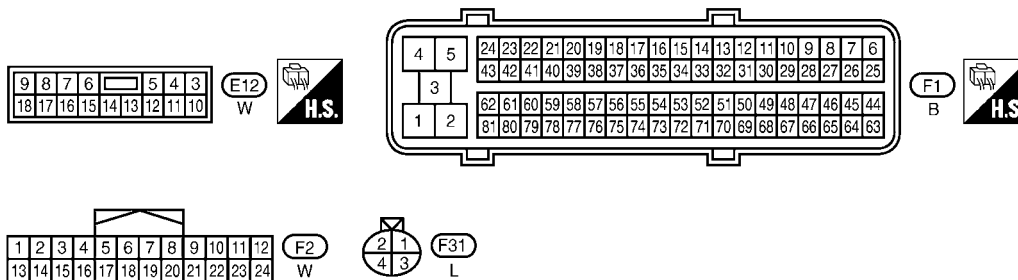
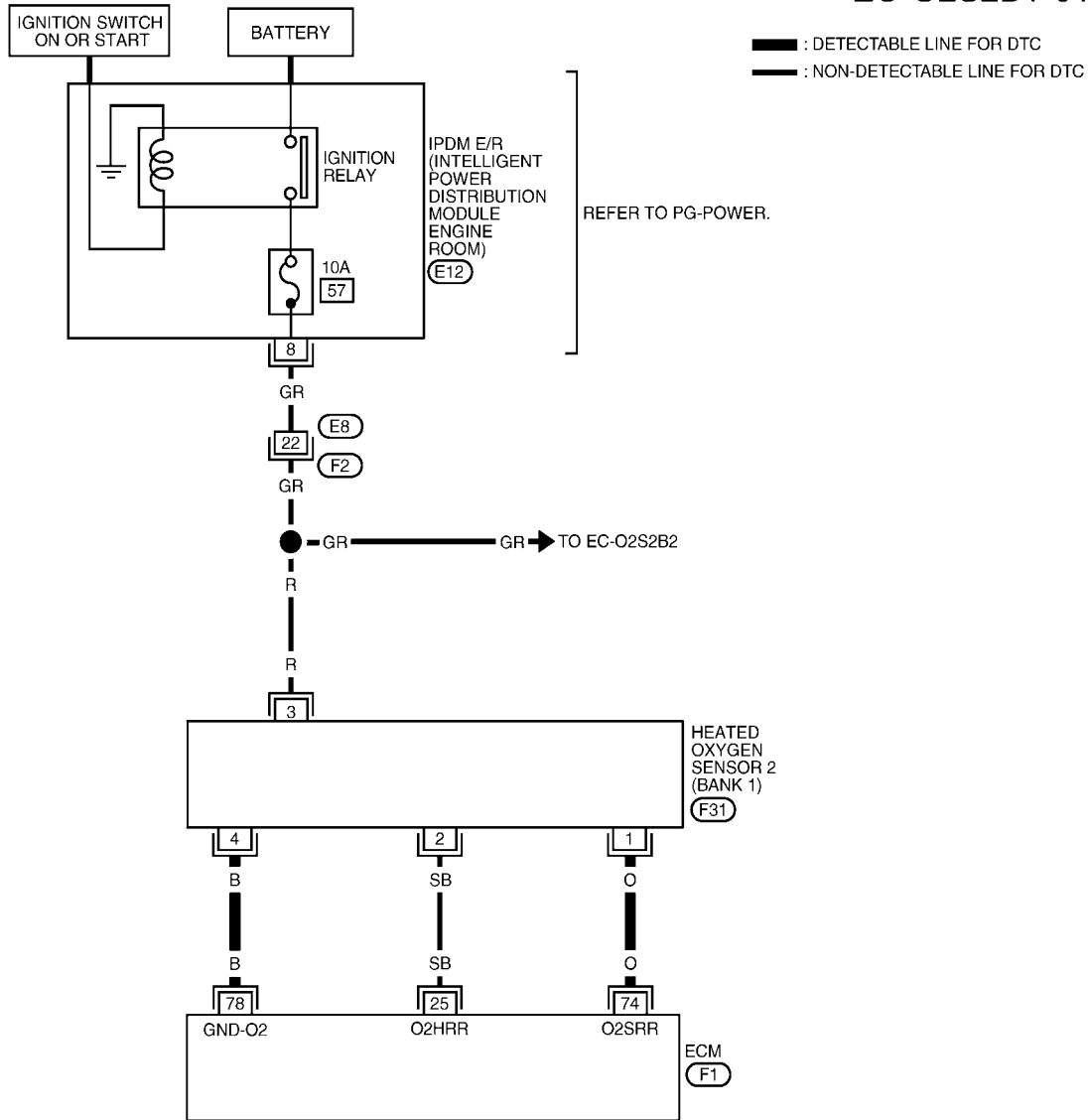


Wiring Diagram

INFOID:000000005448420

BANK 1

EC-O2S2B1-01



JMBWA1211GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1146, P1166 HO2S2

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

A

EC

C

D

E

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G

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I

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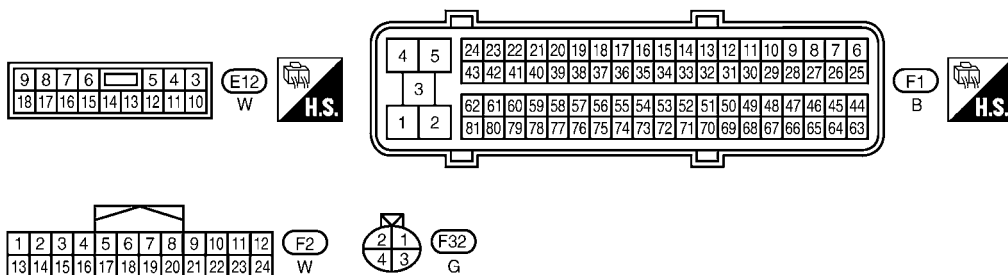
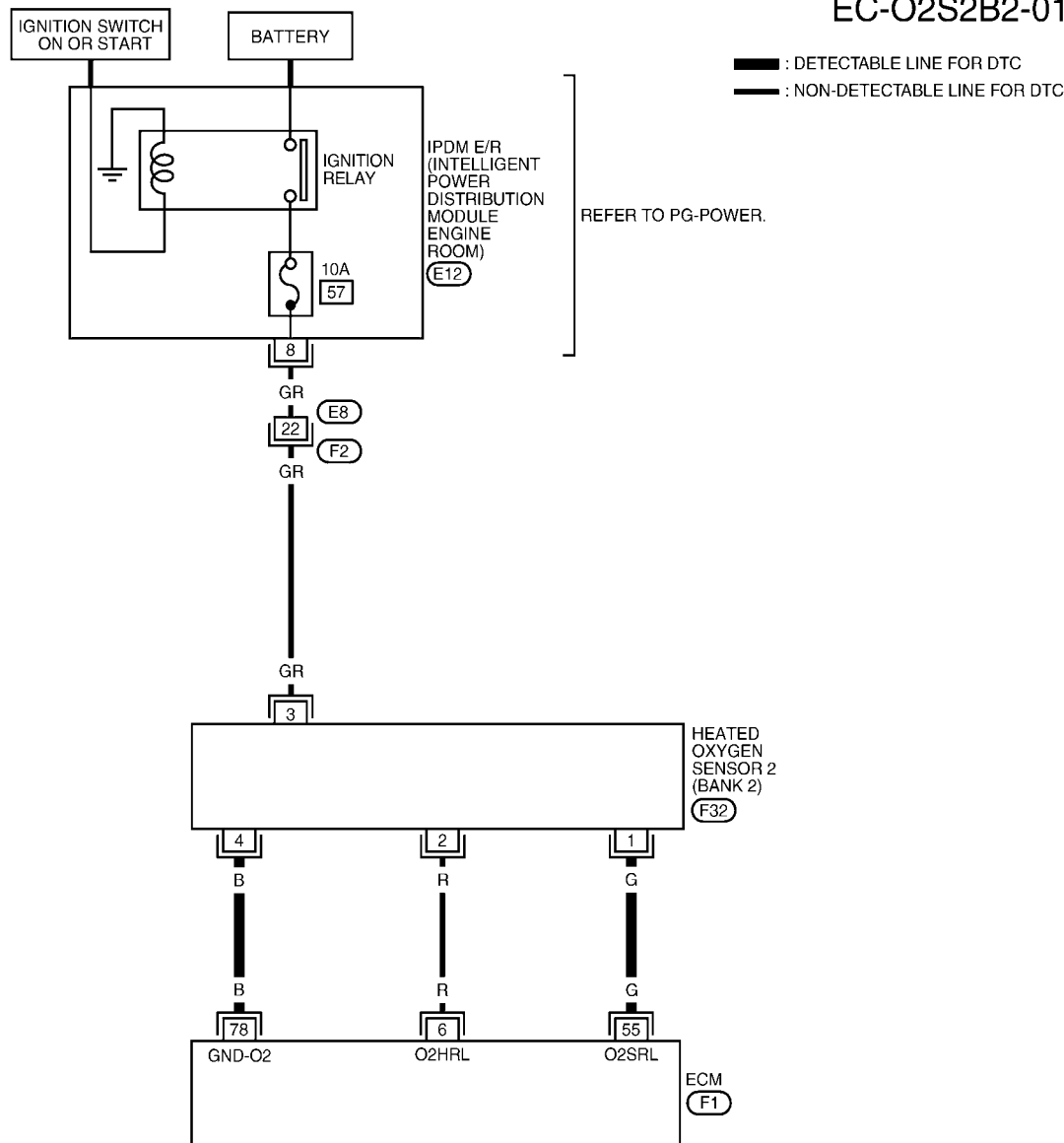
N

O

P

BANK 2

EC-O2S2B2-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1212GB

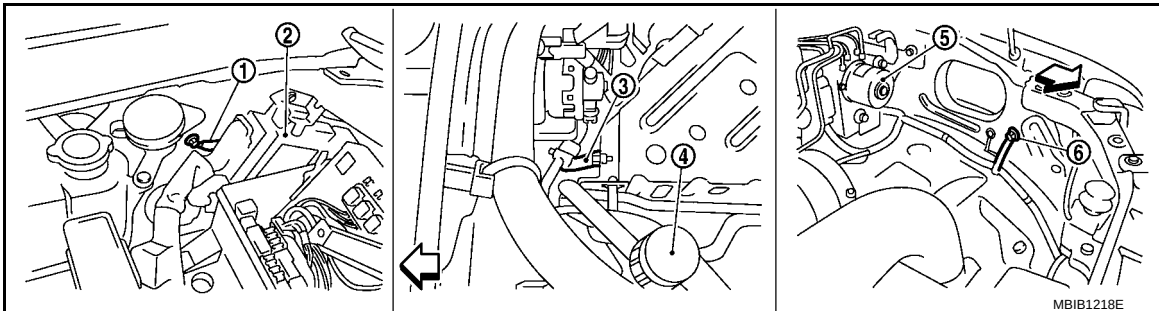
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448421

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↖ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected?

< SERVICE INFORMATION >

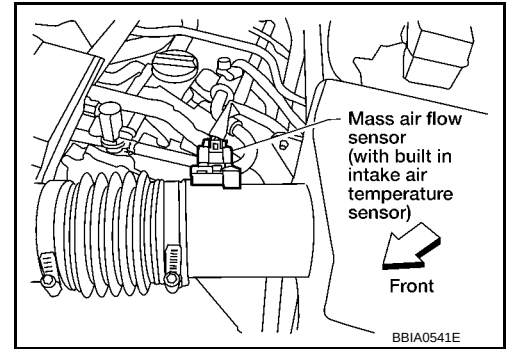
Is it difficult to start engine?

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected?

Is it difficult to start engine?

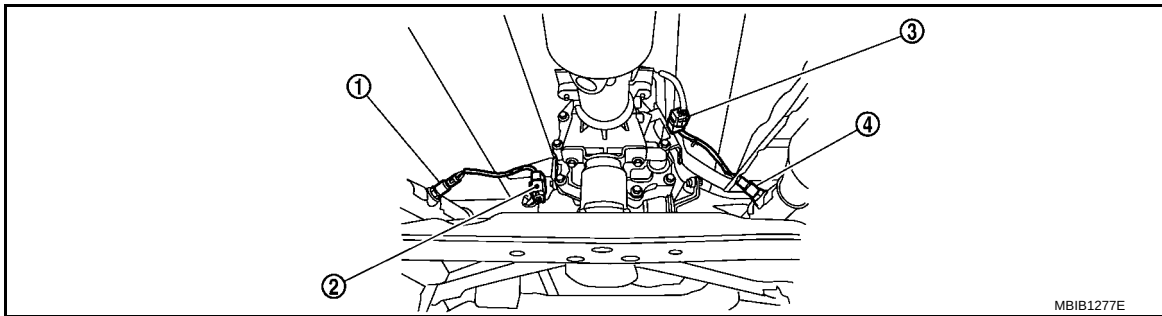


Yes or No

- Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to [EC-214](#).
 No >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	1
P1166	55	1	2

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	1
P1166	55	1	2

Continuity should not exist.

- Also check harness for short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-319, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

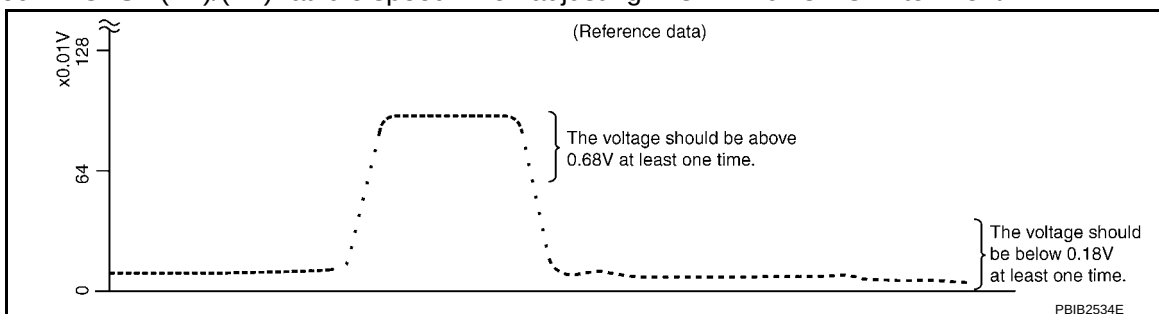
Component Inspection

INFOID:000000005448422

HEATED OXYGEN SENSOR 2

With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

DTC P1146, P1166 HO2S2

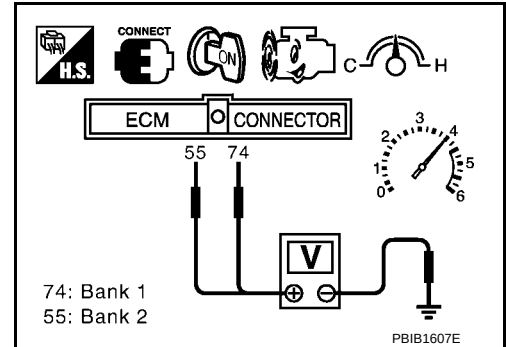
< SERVICE INFORMATION >

[VQ TYPE 1]

- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005448423

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P1147, P1167 HO2S2

Component Description

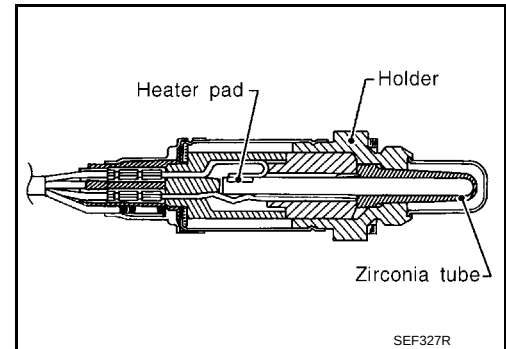
INFOID:000000005448424

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448425

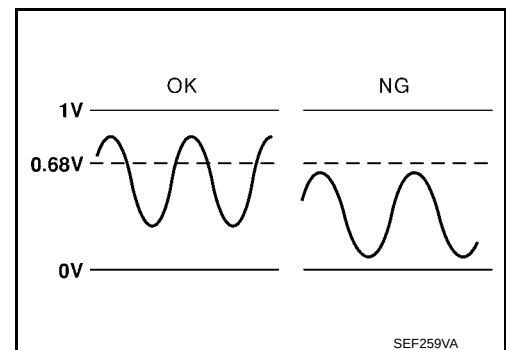
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	- Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN $\longleftrightarrow$ RICH

On Board Diagnosis Logic

INFOID:000000005448426

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147 (Bank 1)	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	- Harness or connectors (The sensor circuit is open or shorted) - Heated oxygen sensor 2 - Fuel pressure - Fuel injector - Intake air leaks
P1167 1167 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448427

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT screen when all tests “COND1”, “COND2” and “COND3” are completed.
- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

< SERVICE INFORMATION >

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in Procedure for COND1.

 WITH CONSULT

Procedure for COND1

For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1147” or “HO2S2 (B2) P1167” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
6. Touch “START”.
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
If “COMPLETED” appears on CONSULT screen, go to step 2 in Procedure for COND3.
If “COMPLETED” does not appear on CONSULT screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position

NOTE:

- If “TESTING” is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.
- If “COMPLETED” already appears at “COND2” on CONSULT screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T models only) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

NOTE:

If “COMPLETE” already appears at “COND3” on CONSULT screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.

Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
If “NG” is displayed, refer to [EC-327, “Diagnosis Procedure”](#).
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
 - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 - b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT
 - c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT.
 - d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.

Overall Function Check

INFOID:000000005448428

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

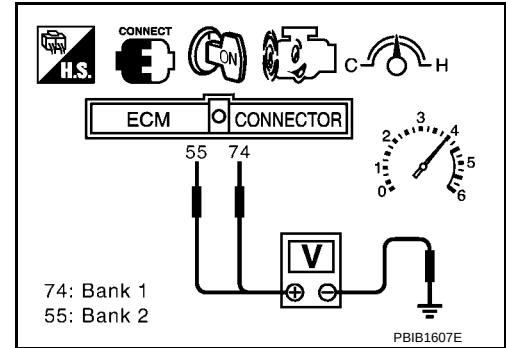
 WITH GST

DTC P1147, P1167 HO2S2

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to [EC-327. "Diagnosis Procedure"](#).

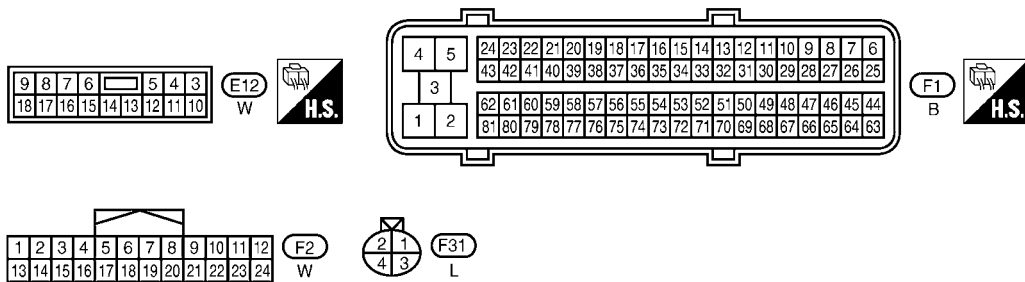
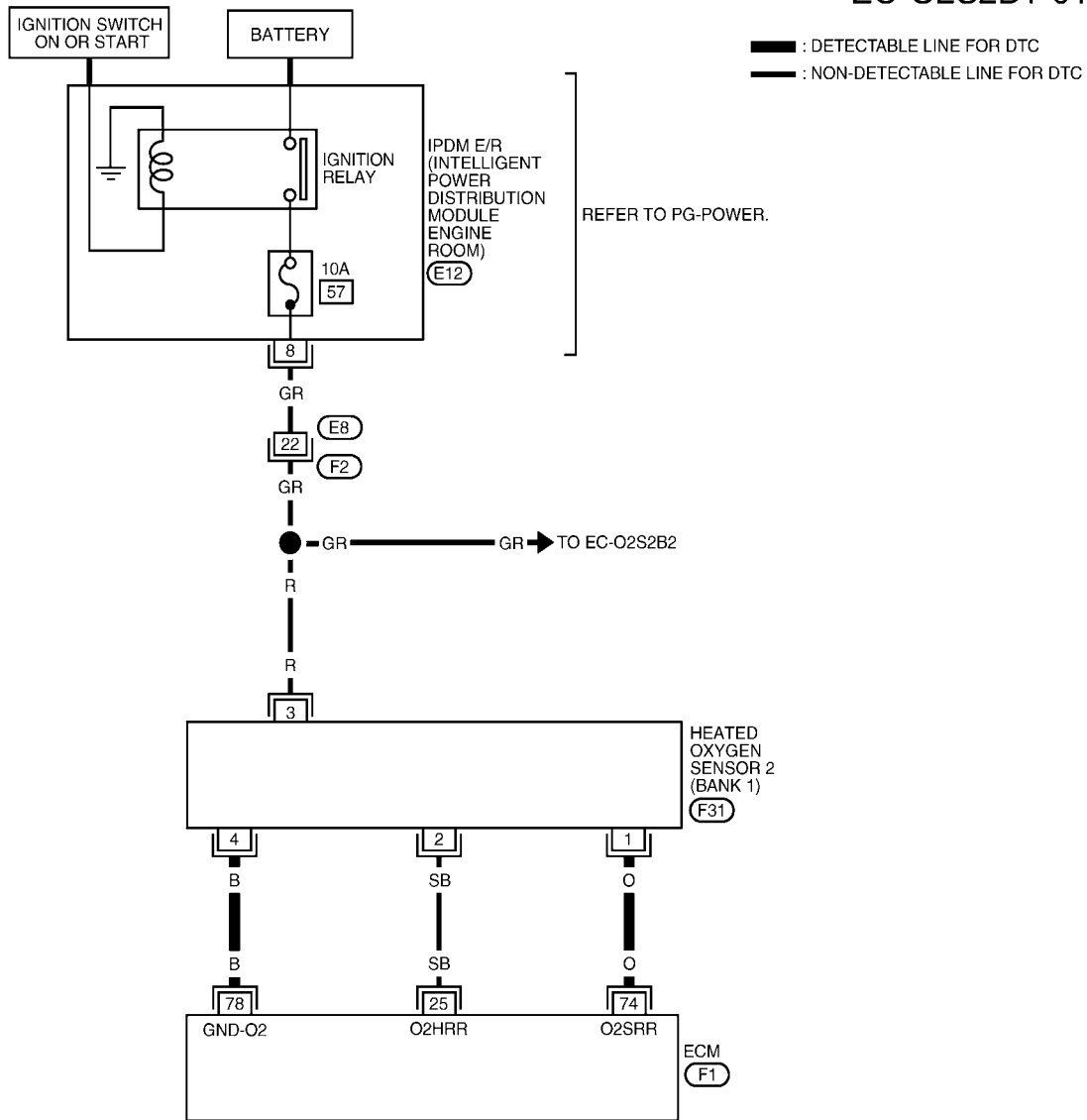


Wiring Diagram

INFOID:000000005448429

BANK 1

EC-O2S2B1-01



JMBWA1211GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1147, P1167 HO2S2

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

A

EC

C

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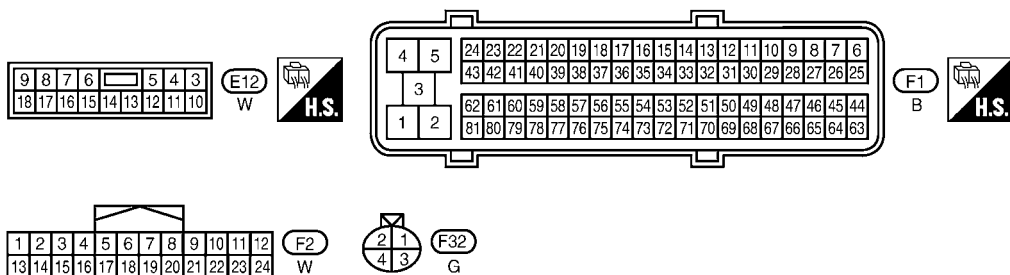
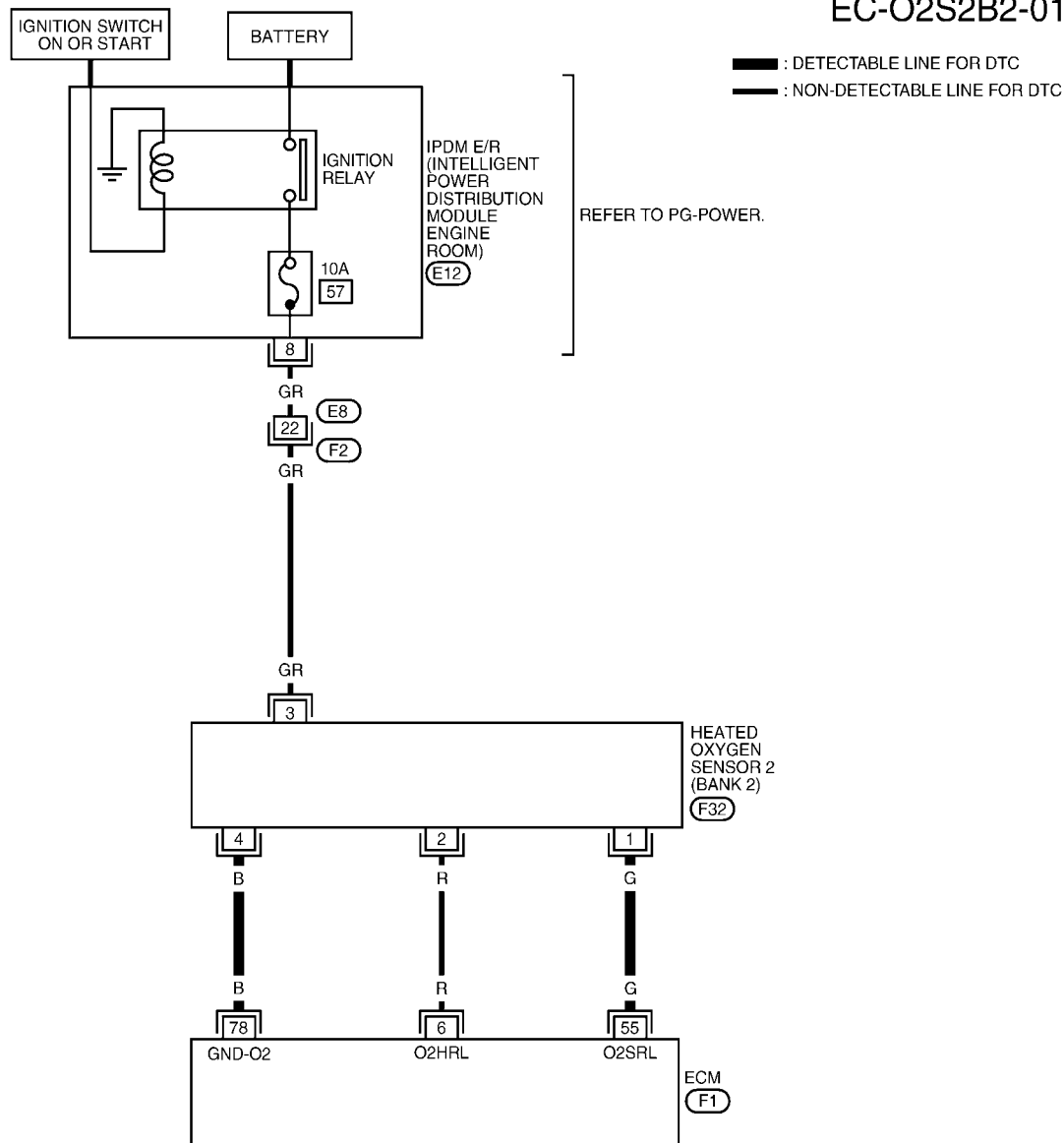
N

O

P

BANK 2

EC-O2S2B2-01



JMBWA1212GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

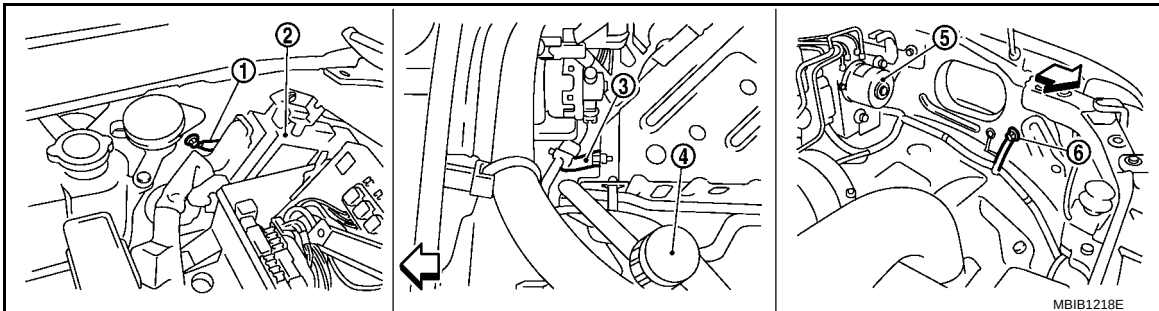
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448430

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0174 detected?

< SERVICE INFORMATION >

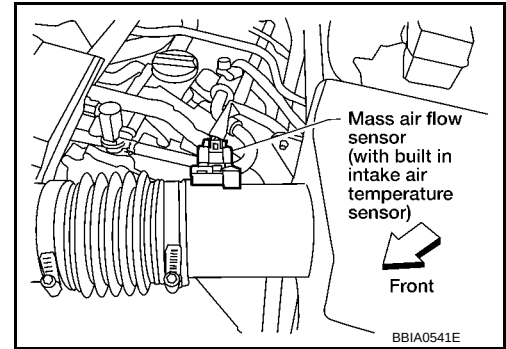
Is it difficult to start engine?

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0174 detected?

Is it difficult to start engine?

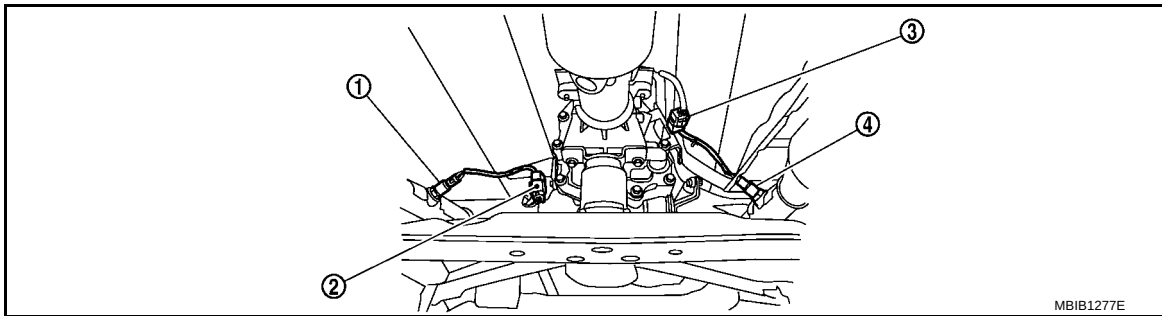


Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to [EC-204](#).
 No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	74	1	1
P1167	55	1	2

Continuity should exist.

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	74	1	1
P1167	55	1	2

Continuity should not exist.

- Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-329, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

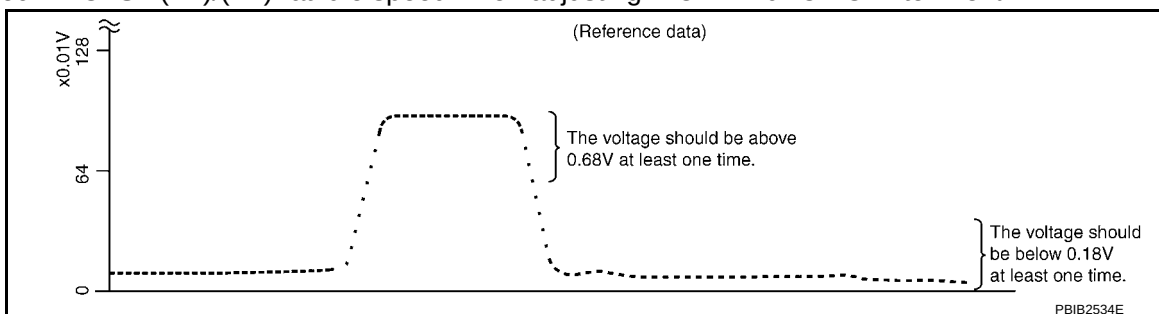
Component Inspection

INFOID:000000005448431

HEATED OXYGEN SENSOR 2

With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

DTC P1147, P1167 HO2S2

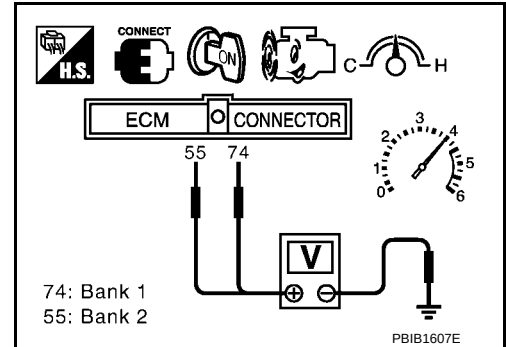
< SERVICE INFORMATION >

[VQ TYPE 1]

- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005448432

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1217 ENGINE OVER TEMPERATURE

Description

INFOID:000000005448433

SYSTEM DESCRIPTION

NOTE:

If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).

Cooling Fan Control

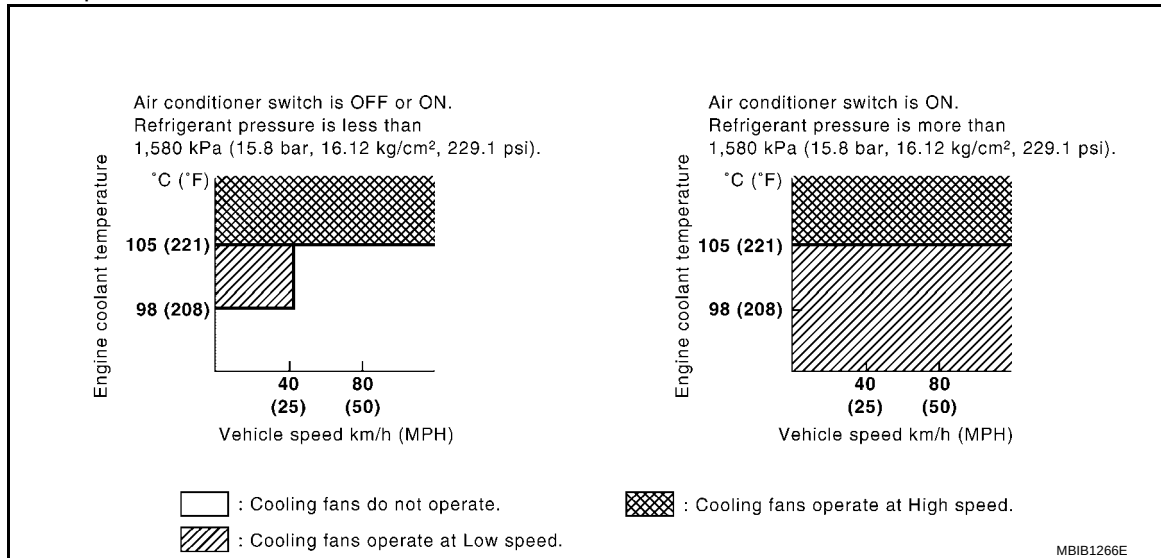
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage* ¹		
Wheel sensor	Vehicle speed* ²		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal* ²		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 1]

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Low (LOW)	1	3
High (HI)	2	3

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448434

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

On Board Diagnosis Logic

INFOID:000000005448435

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	- Cooling fan does not operate properly (Overheat). - Cooling fan system does not operate properly (Overheat). - Engine coolant level was not added to the system using the proper filling method. - Engine coolant is not within the specified range.	- Harness or connectors (The cooling fan circuit is open or shorted.) - IPDM E/R - Cooling fan - Cooling fan (Crankshaft driven) - Radiator hose - Radiator - Radiator cap - Reservoir tank - Reservoir tank cap - Water pump - Thermostat For more information, refer to EC-338, "Main 12 Causes of Overheating".

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [MA-28, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [MA-32, "Changing Engine Oil"](#).

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to [MA-27, "Engine Coolant Mixture Ratio"](#).
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

INFOID:000000005448436

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove a radiator cap and/or a reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 1]

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT

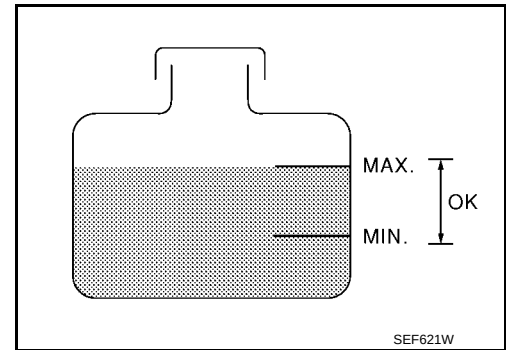
1. Check the coolant level in the reservoir tank and radiator.

NOTE:

Allow engine to cool before checking coolant level.

If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-335, "Diagnosis Procedure"](#).

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-335, "Diagnosis Procedure"](#).
3. Turn ignition switch ON.
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
5. If the results are NG, go to [EC-335, "Diagnosis Procedure"](#).



WITH GST

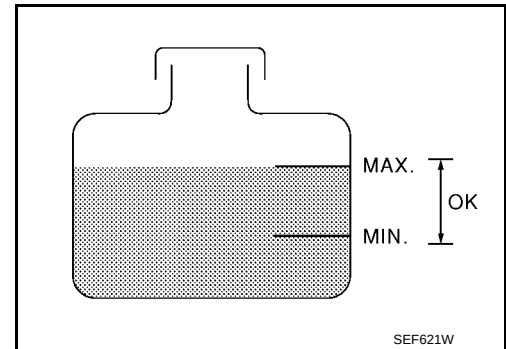
1. Check the coolant level in the reservoir tank and radiator.

NOTE:

Allow engine to cool before checking coolant level.

If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-335, "Diagnosis Procedure"](#).

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-335, "Diagnosis Procedure"](#).
3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PG-28, "Auto Active Test"](#).
4. If NG, go to [EC-335, "Diagnosis Procedure"](#).



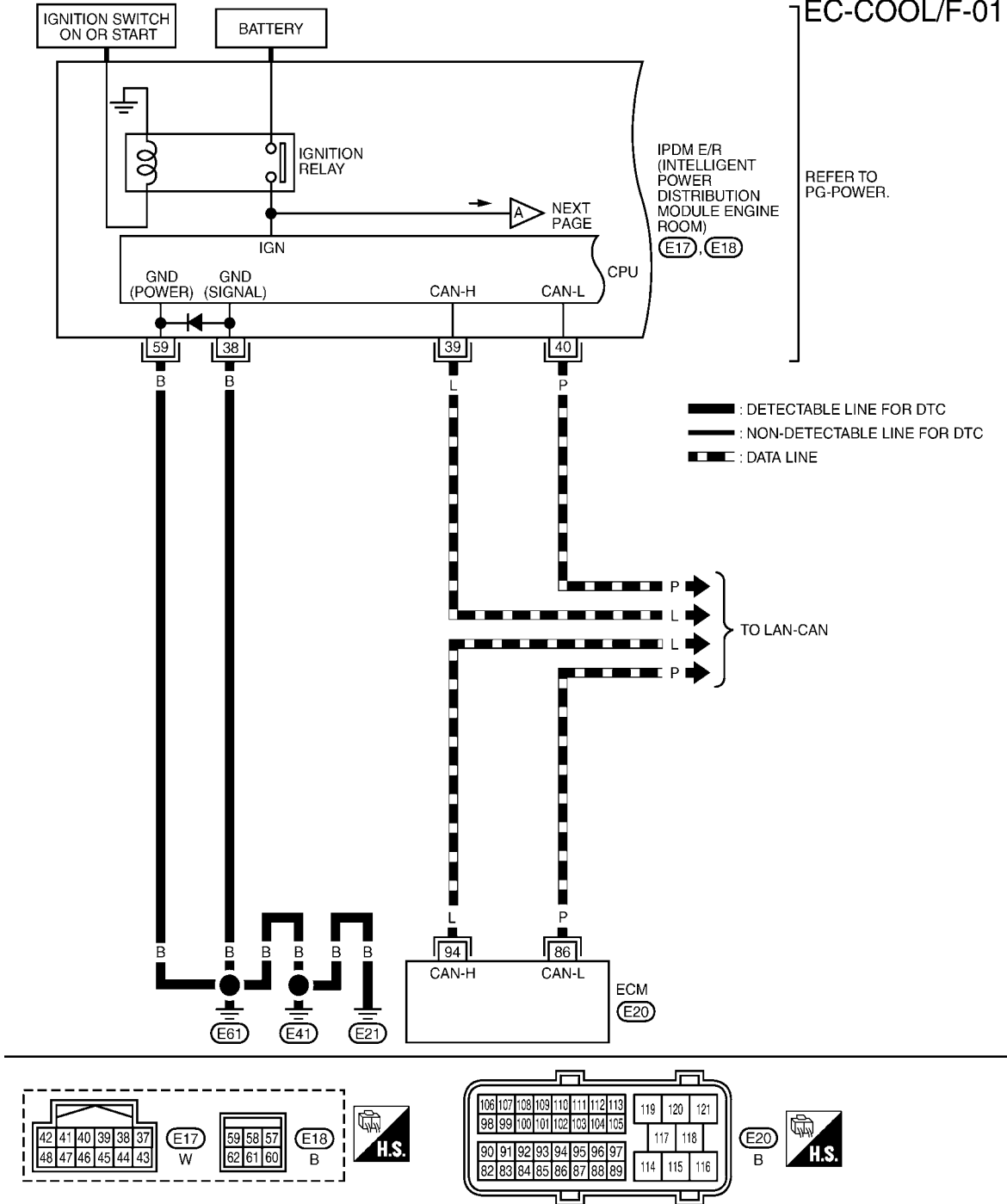
DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448437



JMBWA0437GB

[VQ TYPE 1]

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 1]

< SERVICE INFORMATION >

OK (Without CONSULT)>>GO TO 3.

NG >> Check cooling fan (crankshaft driven). Refer to [CO-21, "Component \(Crankshaft Driven Type\)"](#).

2.CHECK COOLING FAN OPERATION

With CONSULT

1. Start engine and let it idle.
2. Select "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan operate at each speed (LOW/HI).

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Refer to "PROCEDURE A".)

3.CHECK COOLING FAN OPERATION

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to [PG-28, "Auto Active Test"](#).
2. Make sure that cooling fan operate at each speed (Low/High).

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Refer to "PROCEDURE A".)

4.CHECK COOLING SYSTEM FOR LEAK

Refer to [CO-10, "Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Check the following for leak. Refer to [CO-10, "Inspection"](#).

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

5.CHECK RESERVOIR TANK CAP

Refer to [CO-13, "Removal and Installation"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace reservoir tank cap.

6.CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to [CO-28](#).
- Engine coolant temperature sensor. Refer to [EC-178, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning component.

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-338, "Main 12 Causes of Overheating"](#).

>> **INSPECTION END**

PROCEDURE A

1.CHECK COOLILNG FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E14.

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 1]

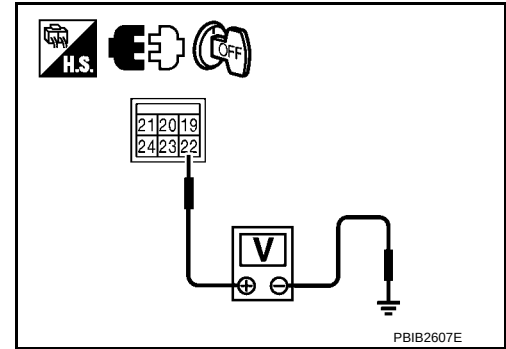
< SERVICE INFORMATION >

3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2.DETECT MALFUNCTIONING PART

Check the following.

- 40A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3.CHECK IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors E17, E18.
2. Check harness continuity between IPDM E/R terminal 38, 59 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4.CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

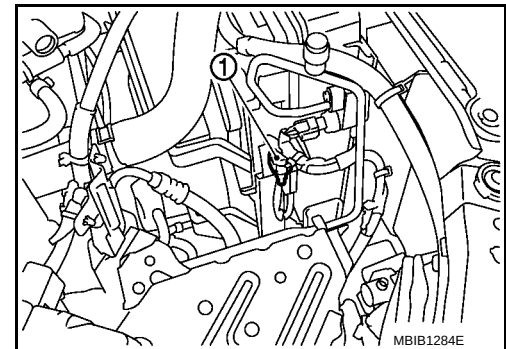
1. Disconnect cooling fan motor harness connector (1).
2. Check harness continuity between the following;
cooling fan motor terminal 1 and IPDM E/R terminal 20,
cooling fan motor terminal 2 and IPDM E/R terminal 24.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



5.CHECK COOLING FAN MOTOR GROUND CIRCUIT FOR OPEN OR SHORT

1. Check harness continuity between cooling fan motor terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6.CHECK COOLING FAN MOTOR

Refer to [EC-338, "Component Inspection"](#).

OK or NG

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 1]

< SERVICE INFORMATION >

- OK >> GO TO 7.
NG >> Replace cooling fan motors.

7. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connector.

Main 12 Causes of Overheating

INFOID:000000005448439

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	- Blocked radiator - Blocked condenser - Blocked radiator grille - Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-27
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-28
	4	• Reservoir tank cap	• Pressure tester	59 - 117.8 kPa (0.59 - 1.18 bar, 0.6 - 1.2 kg/cm ² , 9 - 17 psi) (Limit)	CO-13
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-10
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-28
ON*1	7	• Cooling fan	• CONSULT	Operating	See trouble diagnosis for DTC P1217 (EC-331).
ON*2	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See CO-21 .
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	MA-28
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	MA-28
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-89
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-104

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to [CO-7](#).

Component Inspection

INFOID:000000005448440

COOLING FAN MOTOR

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 1]

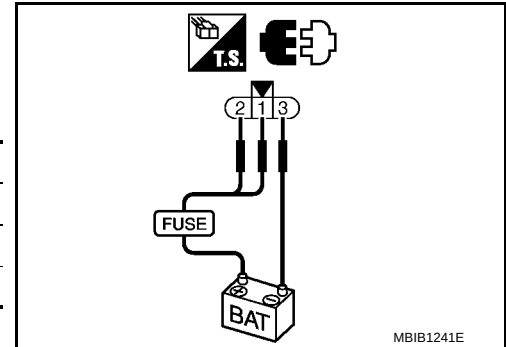
< SERVICE INFORMATION >

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Low	1	3
High	2	3

Cooling fan motor should operate.

If NG, replace cooling fan motor.



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DTC P1225 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

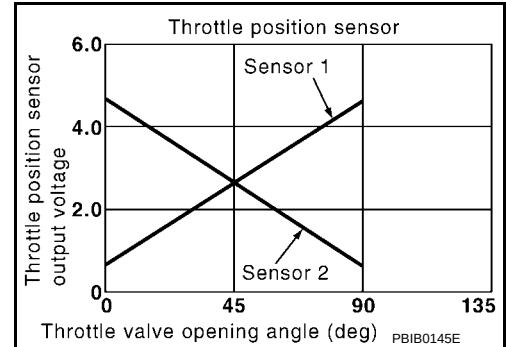
DTC P1225 TP SENSOR

Component Description

INFOID:000000005448441

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005448442

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005448443

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-340, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

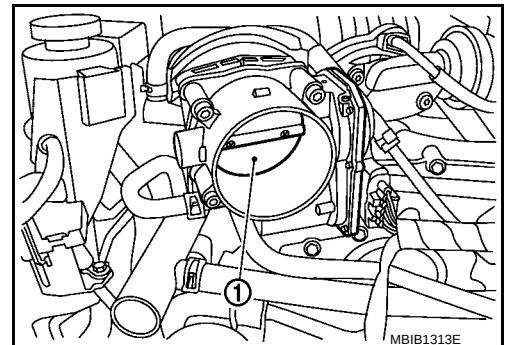
INFOID:000000005448444

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



DTC P1225 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

Removal and Installation

INFOID:0000000005448445

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

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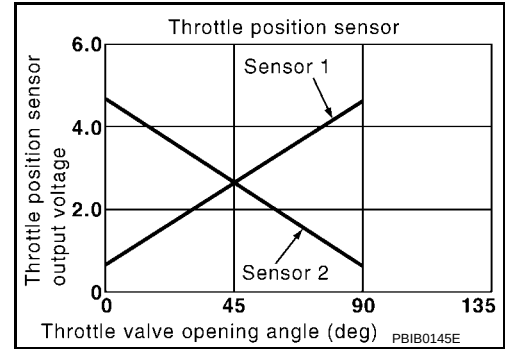
DTC P1226 TP SENSOR

Component Description

INFOID:000000005448446

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005448447

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005448448

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-342, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

INFOID:000000005448449

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

DTC P1226 TP SENSOR

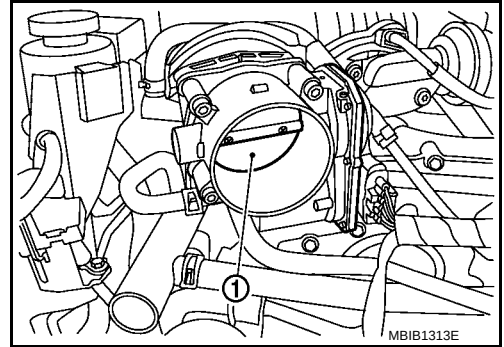
[VQ TYPE 1]

< SERVICE INFORMATION >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

Removal and Installation

INFOID:000000005448450

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1229 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:000000005448451

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • EVAP control system pressure sensor • Power steering pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448452

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-348, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

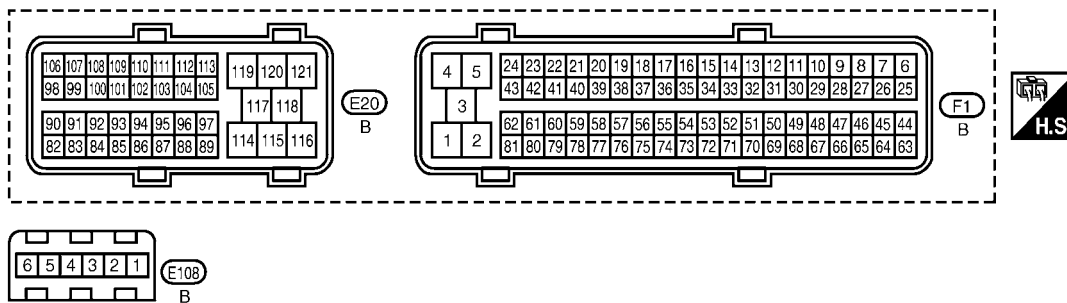
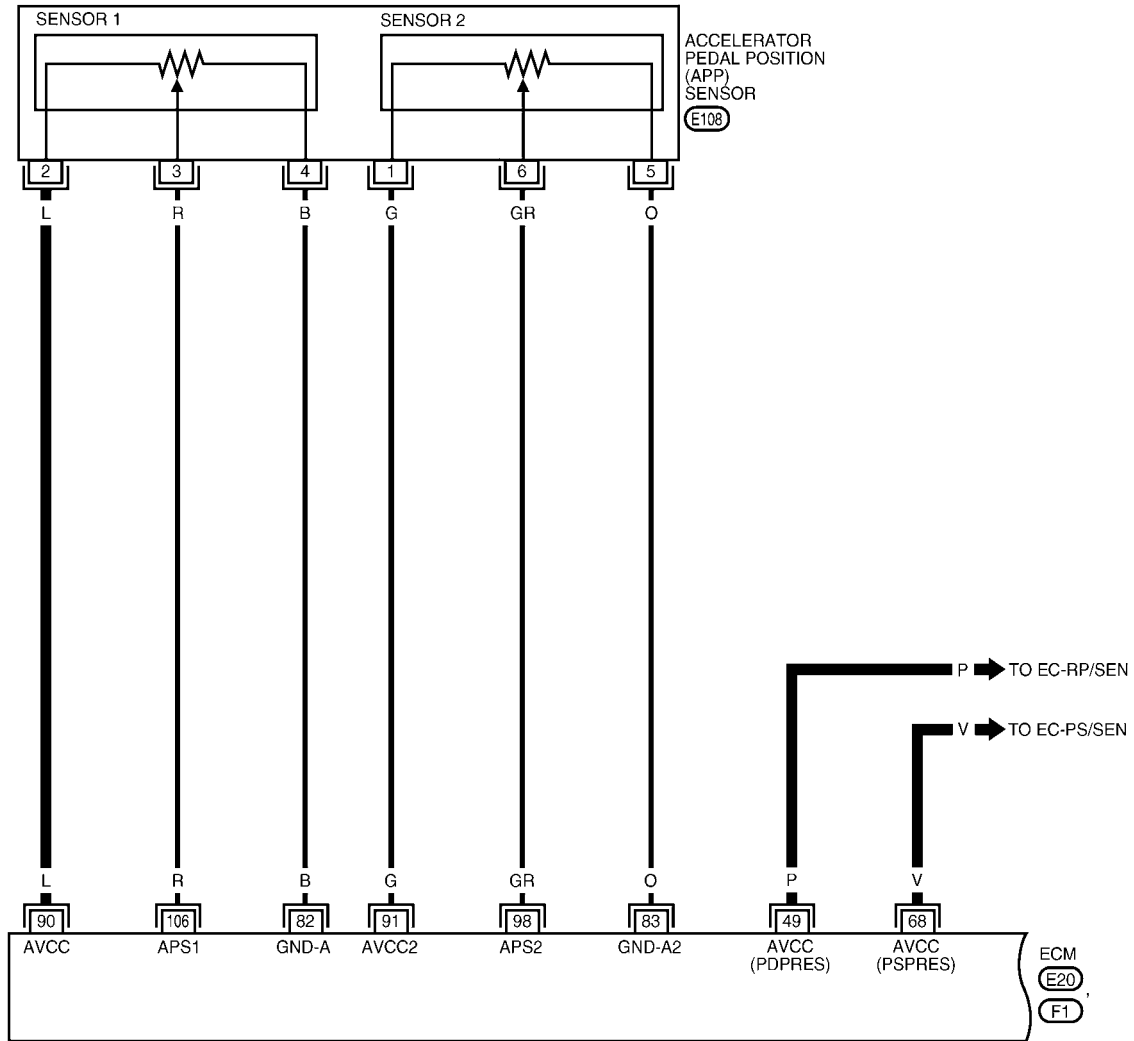
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448453

EC-SEN/PW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

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DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 1]

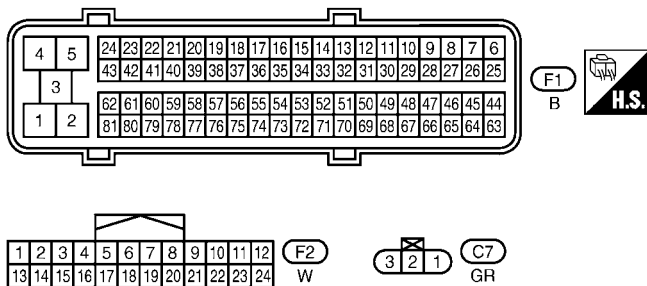
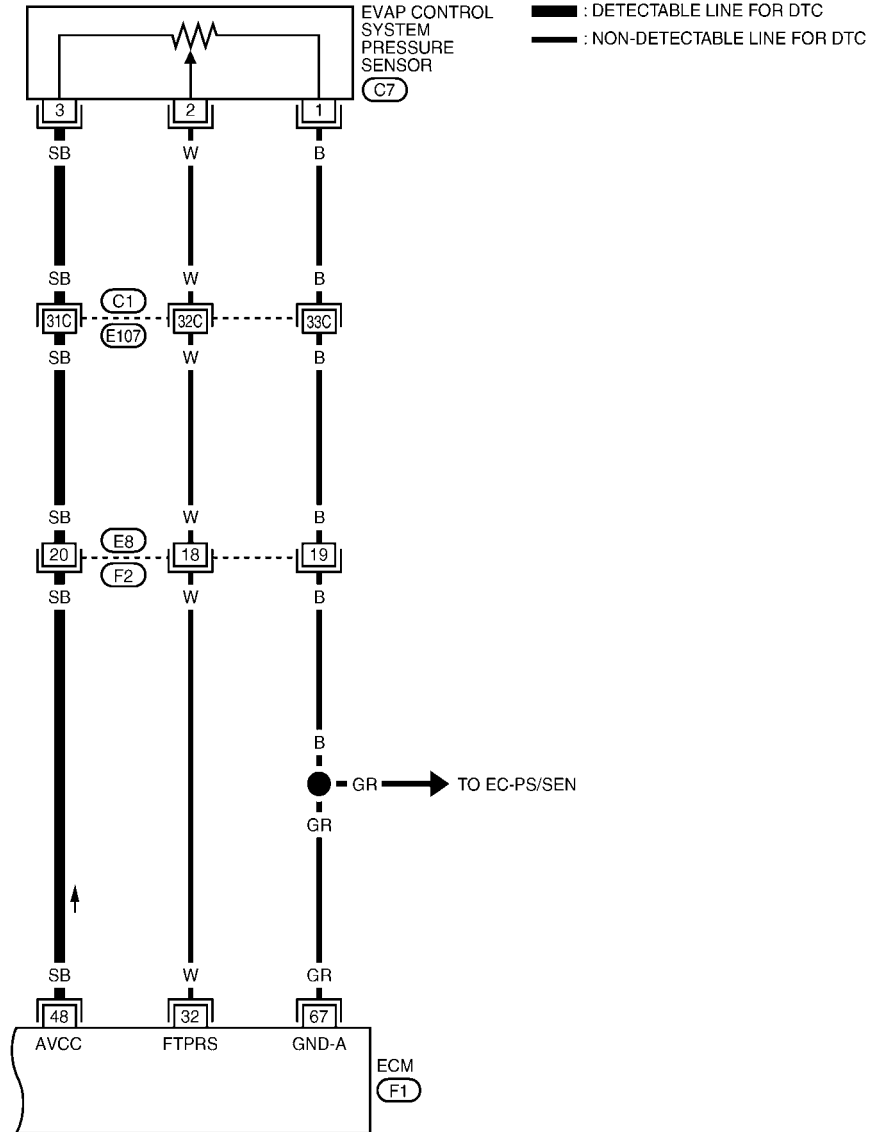
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 1]

EC-SEN/PW-02



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0439GB

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 1]

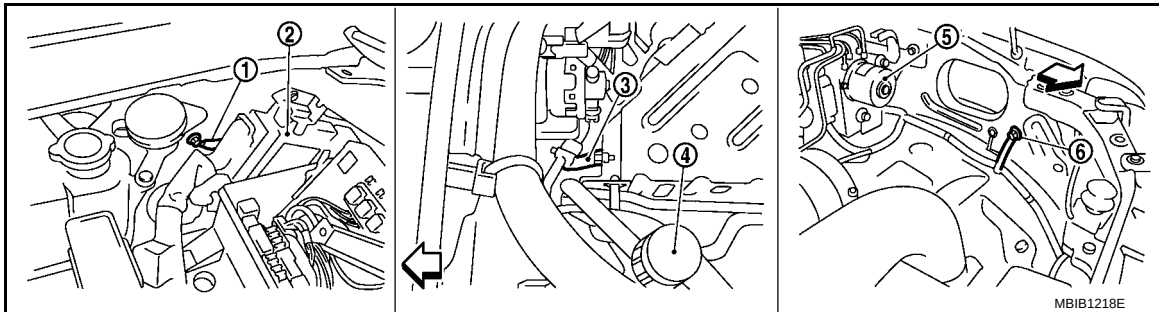
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	W	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448454

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground three screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

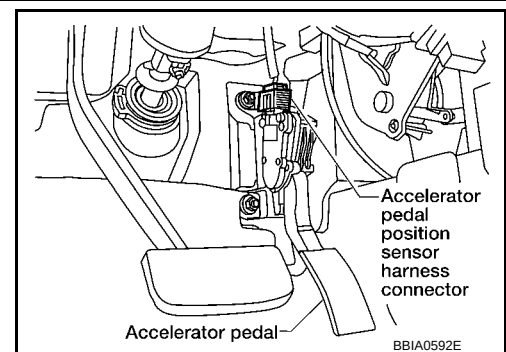
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



DTC P1229 SENSOR POWER SUPPLY

[VQ TYPE 1]

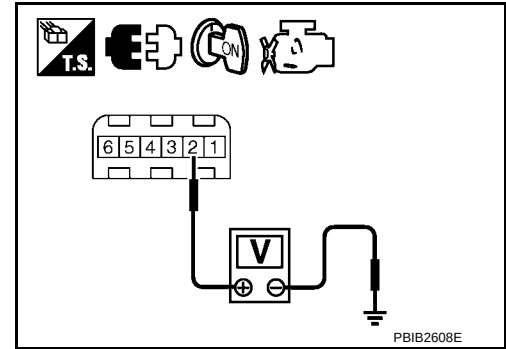
< SERVICE INFORMATION >

3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 6.
NG >> GO TO 3.



3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-345
48	EVAP control system pressure sensor terminal 3	EC-345
49	Refrigerant pressure sensor terminal 3	EC-512
68	PSP sensor terminal 3	EC-270

OK or NG

- OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

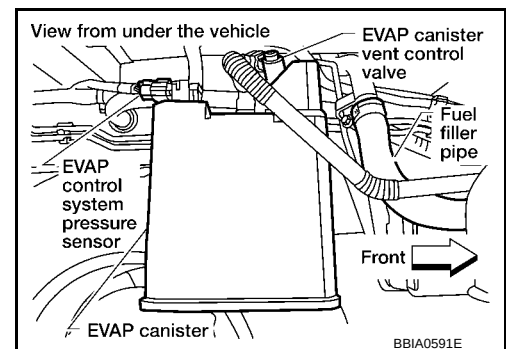
- Refrigerant pressure sensor (Refer to [EC-513. "Diagnosis Procedure".](#))
- Power steering pressure sensor (Refer to [EC-272. "Component Inspection".](#))

OK or NG

- OK >> GO TO 5.
NG >> Replace malfunctioning component.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.



2. Install a vacuum pump to EVAP control system pressure sensor.

DTC P1229 SENSOR POWER SUPPLY

[VQ TYPE 1]

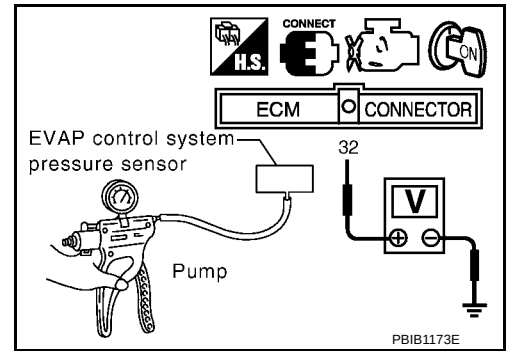
< SERVICE INFORMATION >

- Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mbar, mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-267, -200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-933 mbar, -700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (1013 mbar, 760 mmHg, 29.92 inHg).



OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP control system pressure sensor.

6.CHECK APP SENSOR

Refer to [EC-447, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
- Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
- Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1271, P1281 A/F SENSOR 1

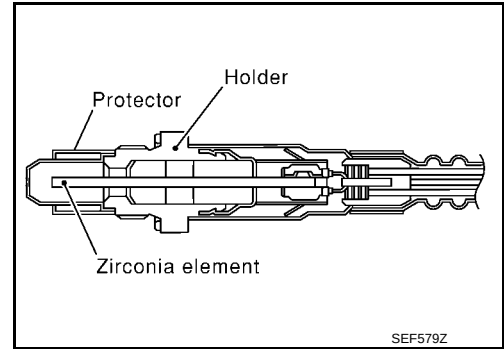
Component Description

INFOID:000000005448455

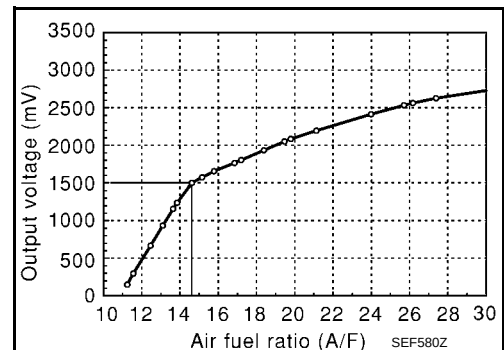
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448456

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448457

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271 (Bank 1) P1281 1281 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 0V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005448458

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 0V, go to [EC-356. "Diagnosis Procedure"](#).
If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Gear position	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-356. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

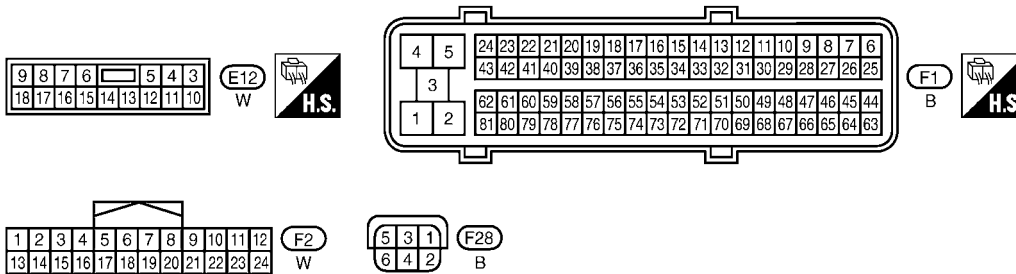
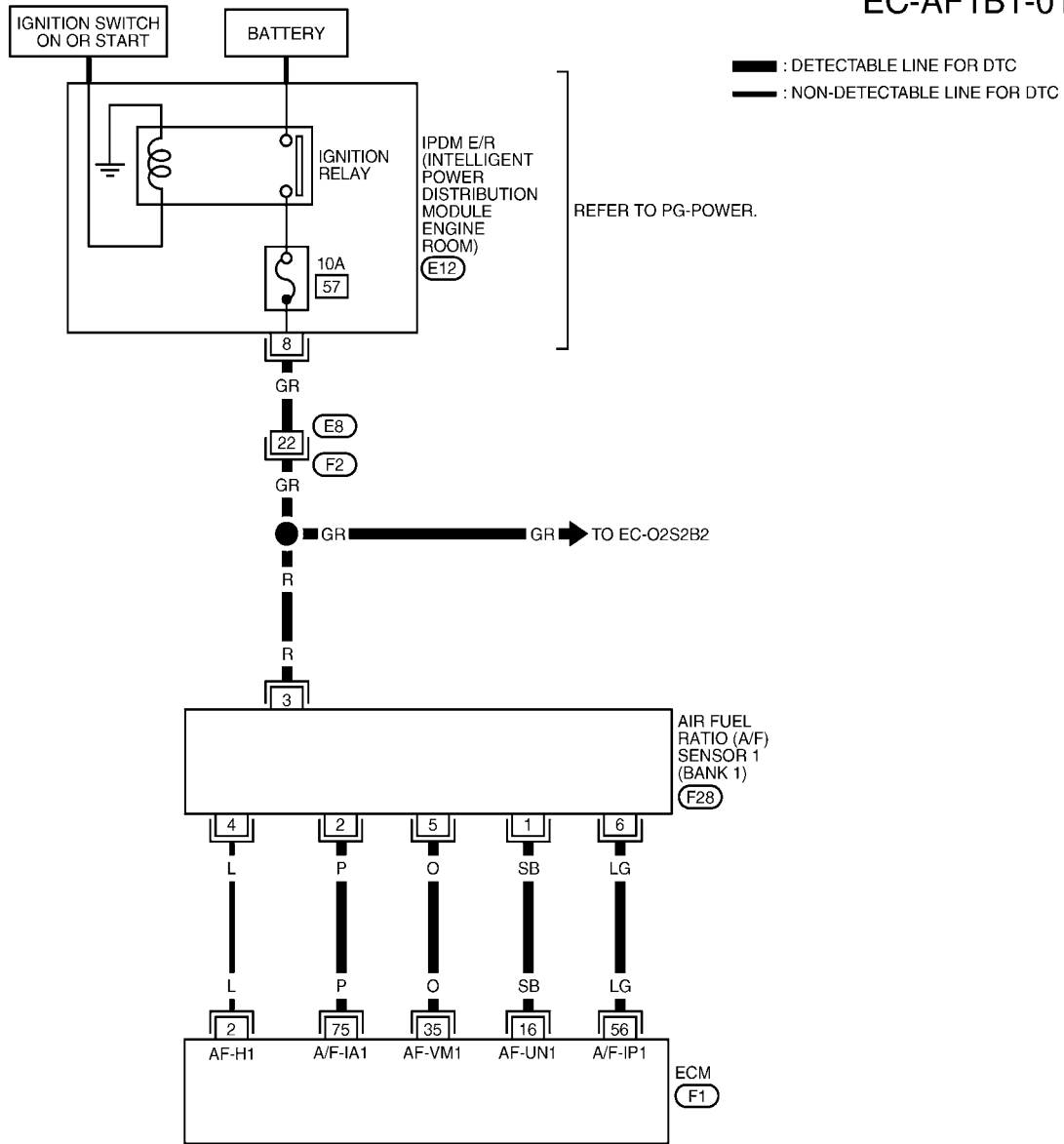
Wiring Diagram

INFOID:000000005448459

BANK 1

EC-AF1B1-01

EC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

CAUTION:

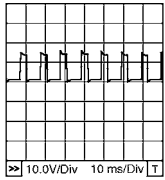
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

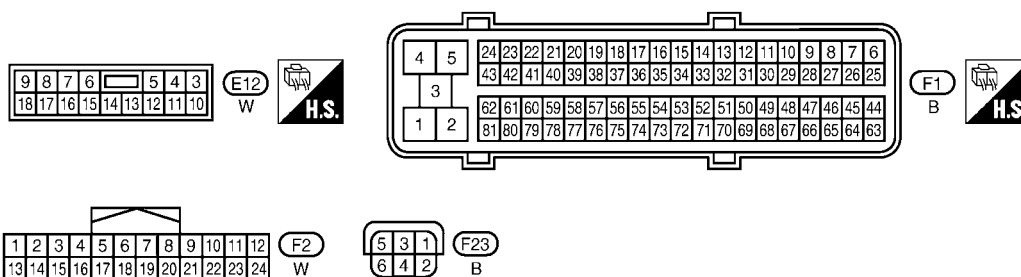
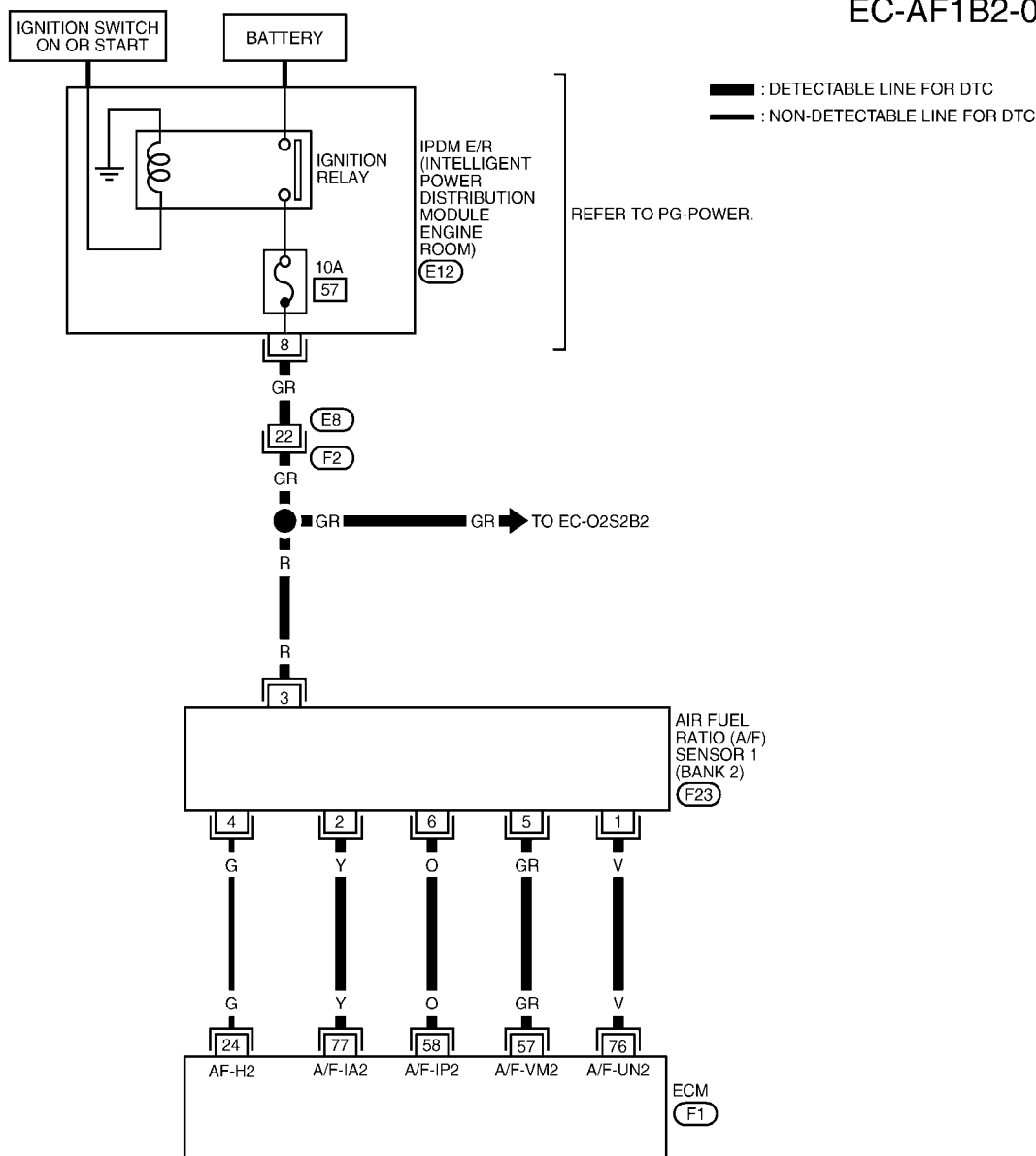
DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

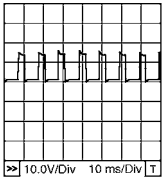
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

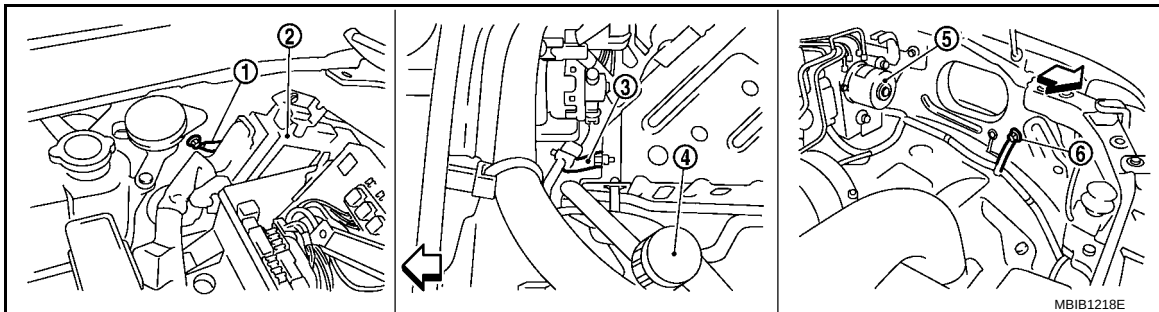
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448460

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

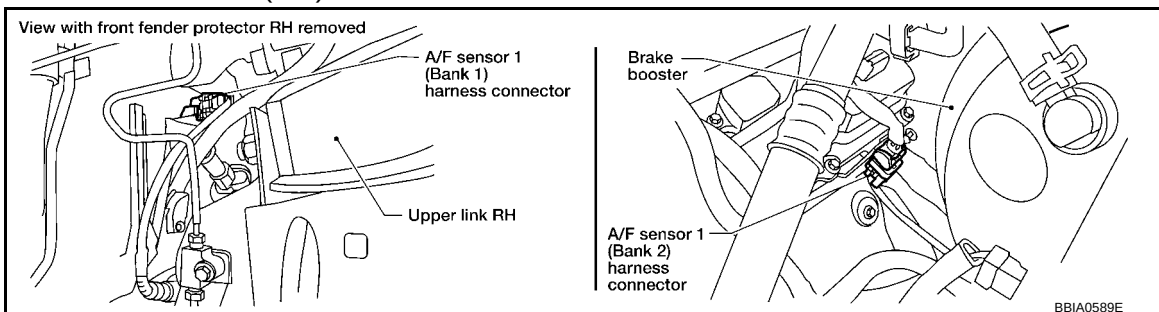
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.



- Turn ignition switch ON.

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

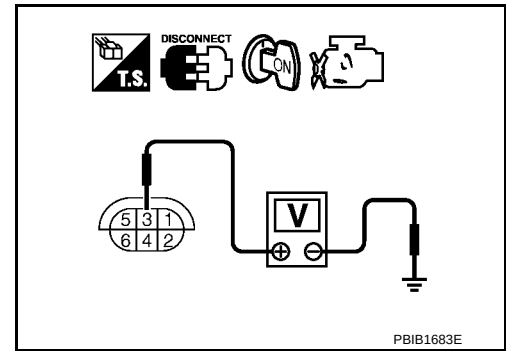
[VQ TYPE 1]

3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448461

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1272, P1282 A/F SENSOR 1

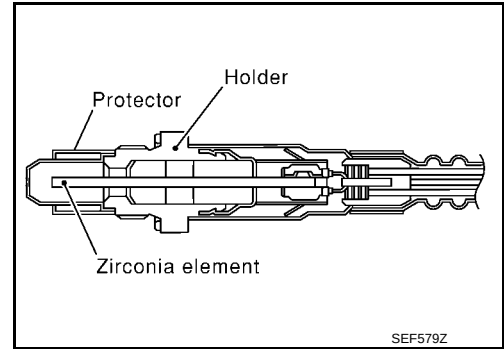
Component Description

INFOID:000000005448462

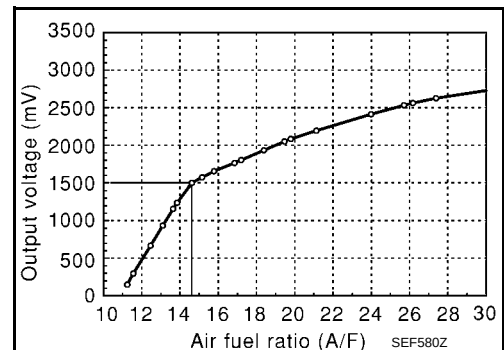
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448463

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448464

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272 (Bank 1) P1282 1282 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 5V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005448465

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

⑧ WITH CONSULT

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 5V, go to [EC-364. "Diagnosis Procedure"](#).
If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-364. "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

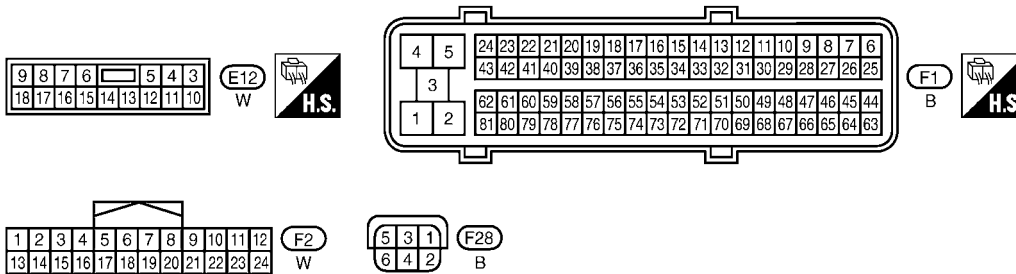
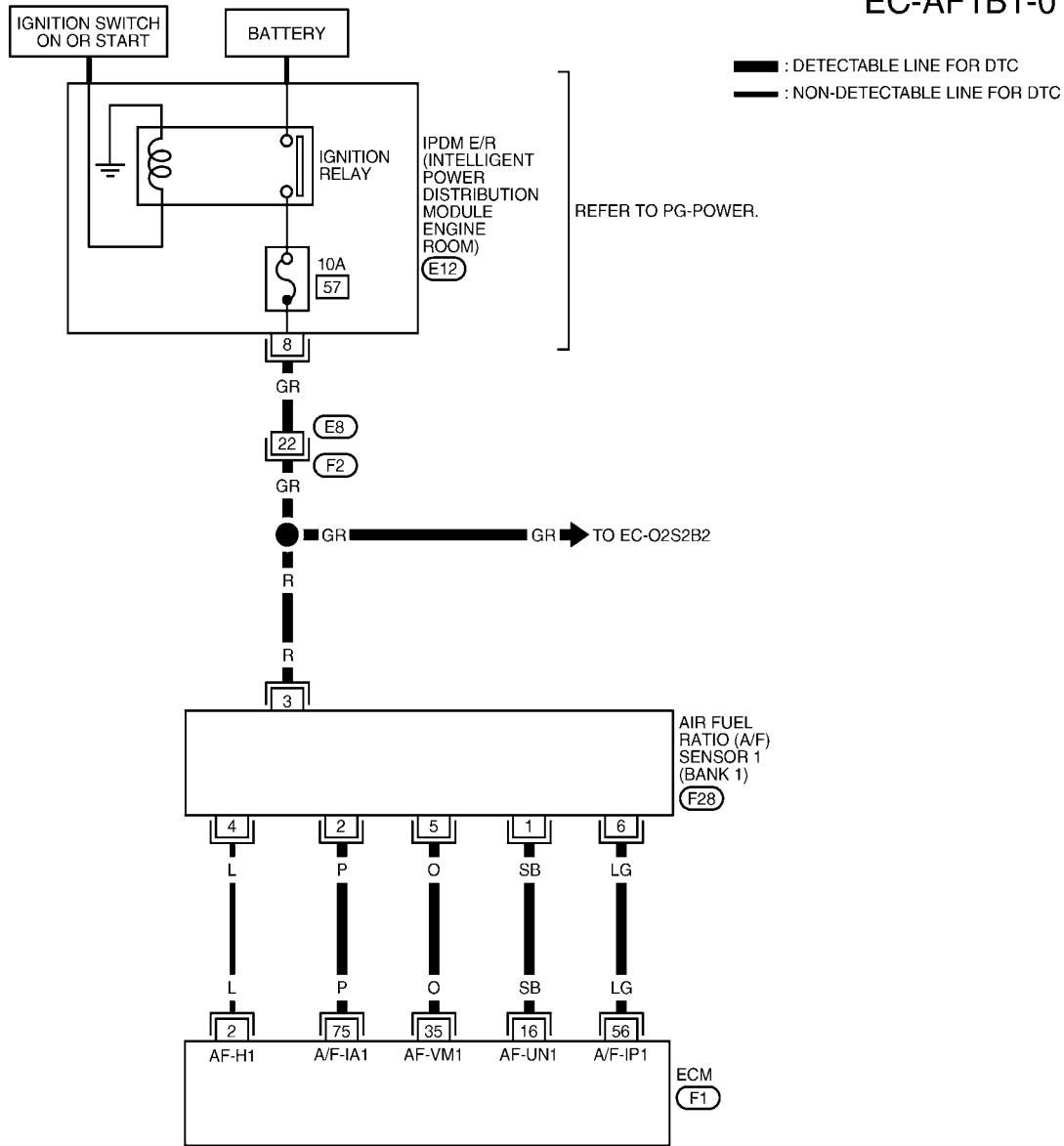
Wiring Diagram

INFOID:000000005448466

BANK 1

EC-AF1B1-01

EC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

CAUTION:

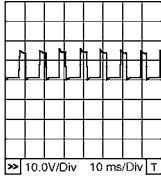
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

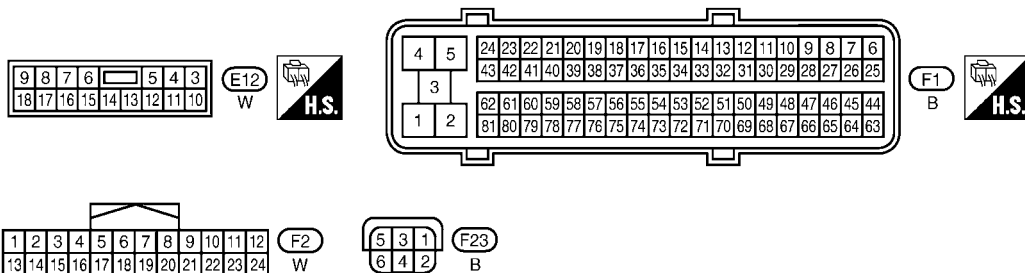
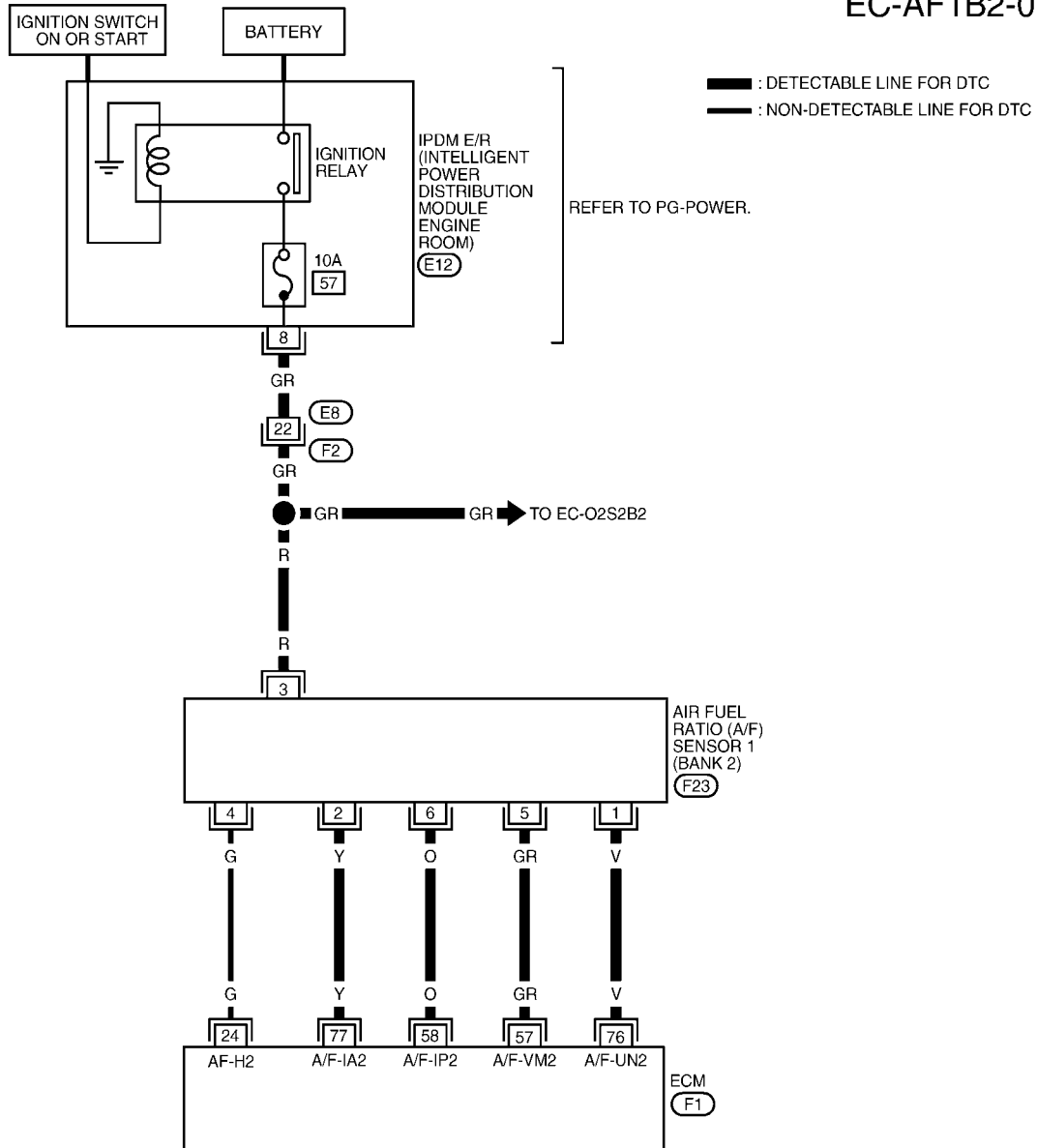
DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

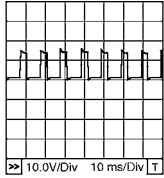
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

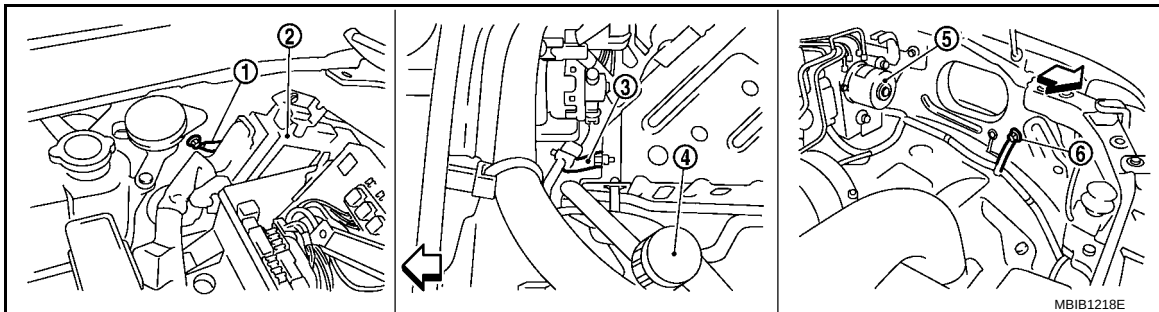
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448467

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws.Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

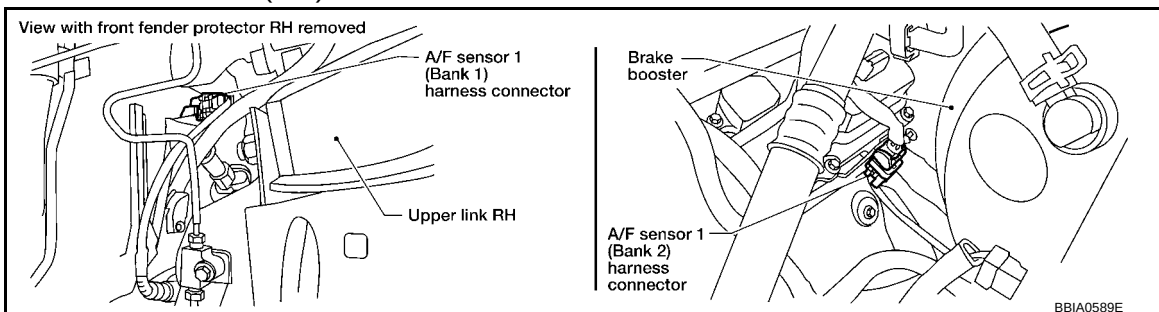
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.

DTC P1272, P1282 A/F SENSOR 1

[VQ TYPE 1]

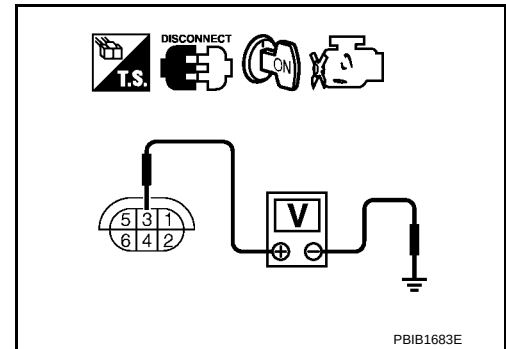
< SERVICE INFORMATION >

- Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1272, P1282 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448468

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1273, P1283 A/F SENSOR 1

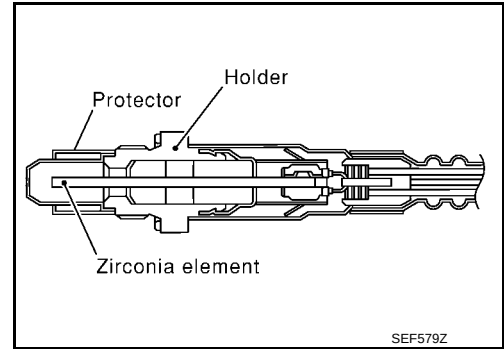
Component Description

INFOID:000000005448469

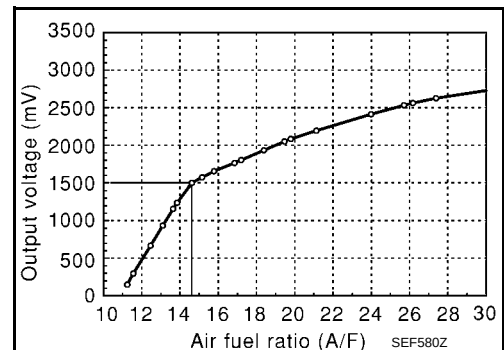
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448470

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448471

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1273 1273 (Bank 1) P1283 1283 (Bank 2)	Air fuel ratio (A/F) sensor 1 lean shift monitoring	• The output voltage computed by ECM from the air fuel ratio (A/F) sensor 1 signal is shifted to the lean side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:000000005448472

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

⑧ WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

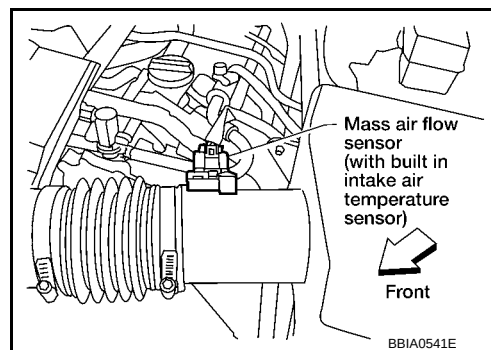
[VQ TYPE 1]

3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
4. Clear the self-learning coefficient by touching "CLEAR".
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to [EC-372, "Diagnosis Procedure"](#).



WITH GST

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch OFF and wait at least 10 seconds.
 3. Disconnect mass air flow sensor harness connector.
 4. Start engine and let it idle for at least 5 seconds.
 5. Stop engine and reconnect mass air flow sensor harness connector.
 6. Select Service \$03 with GST and make sure that DTC P0102 is detected.
 7. Select Service \$04 with GST and erase the DTC P0102.
 8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
 9. Let engine idle for 1 minute.
 10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
 11. Select Service \$07 with GST.
- If 1st trip DTC is detected, go to [EC-372, "Diagnosis Procedure"](#).



DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

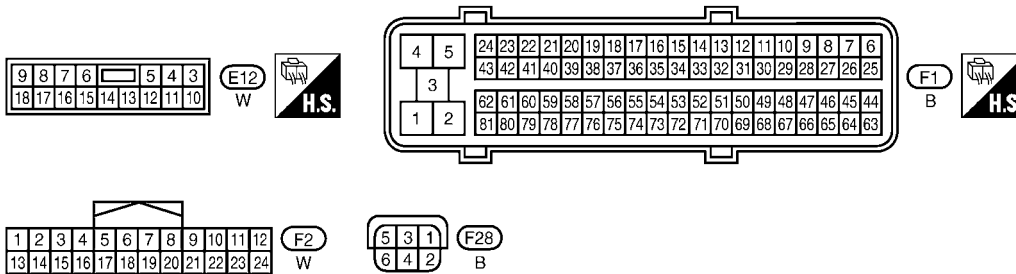
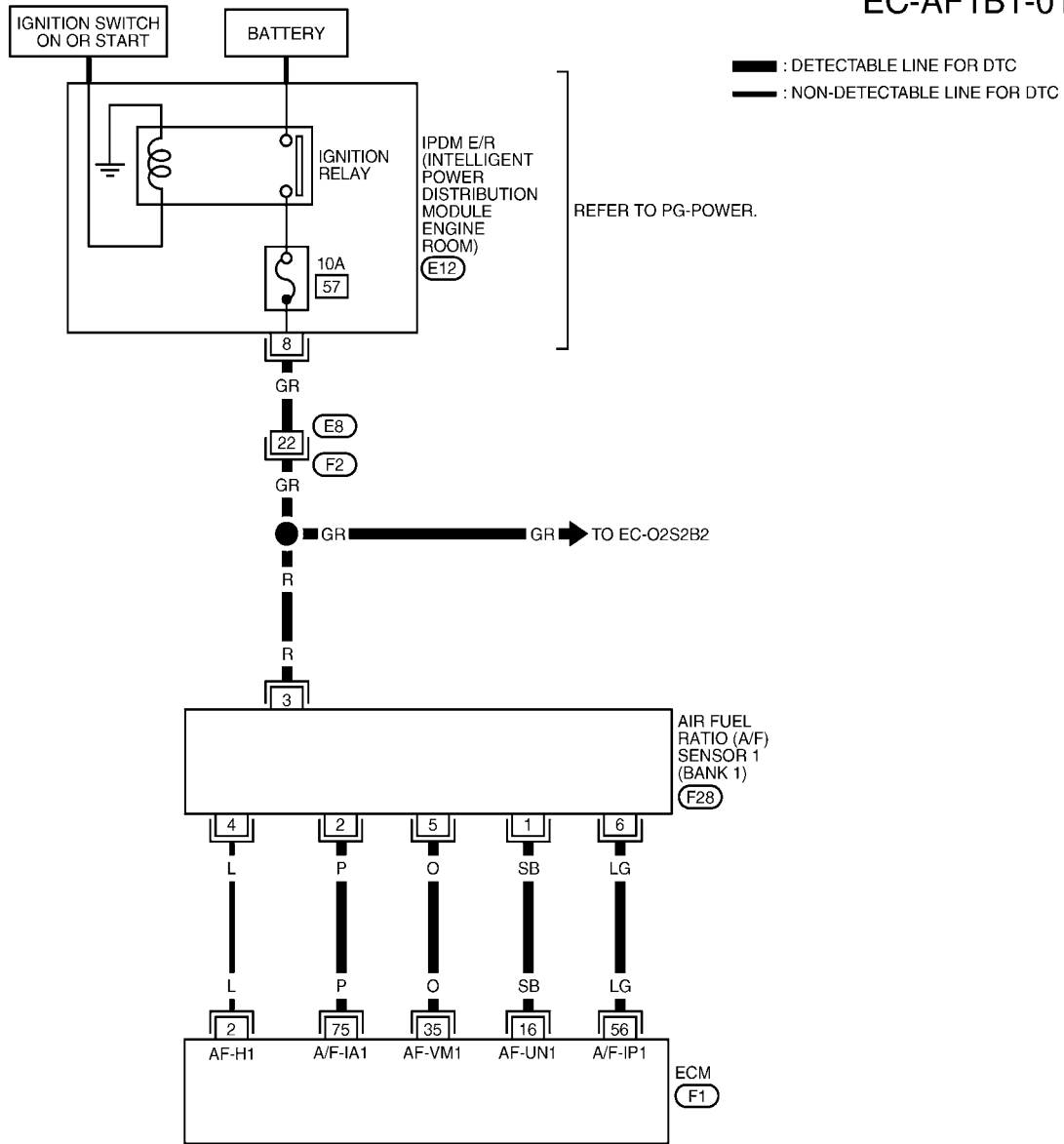
Wiring Diagram

INFOID:000000005448473

BANK 1

EC-AF1B1-01

EC



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

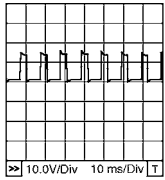
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

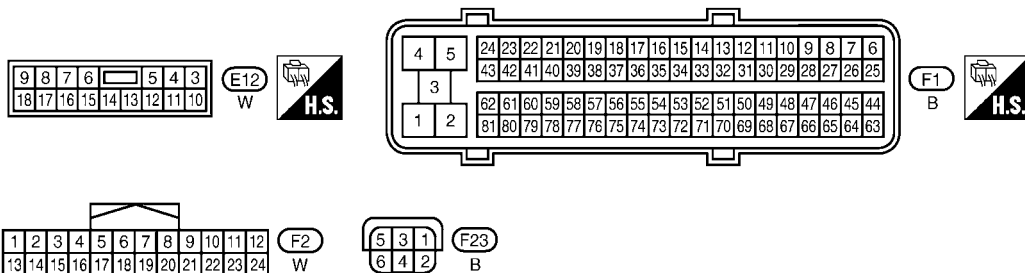
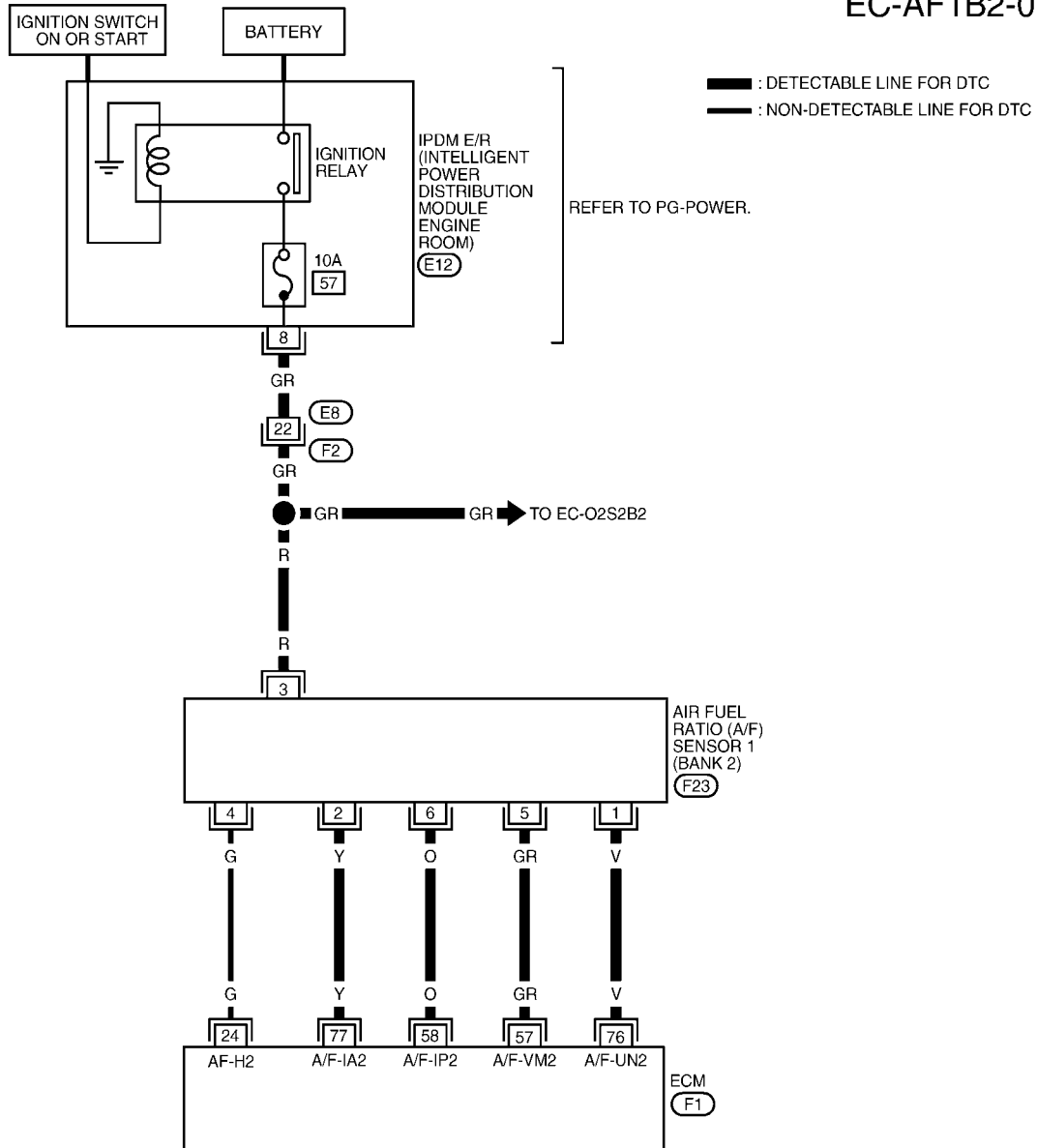
DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

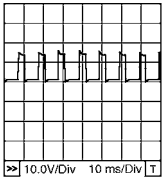
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

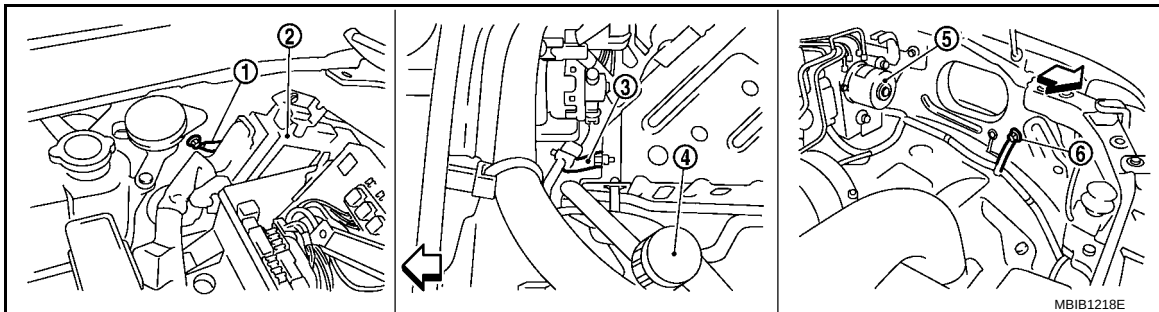
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448474

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

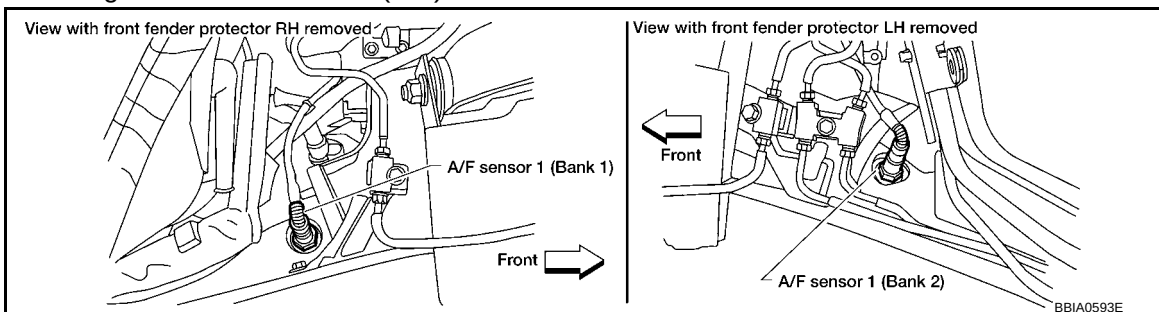
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

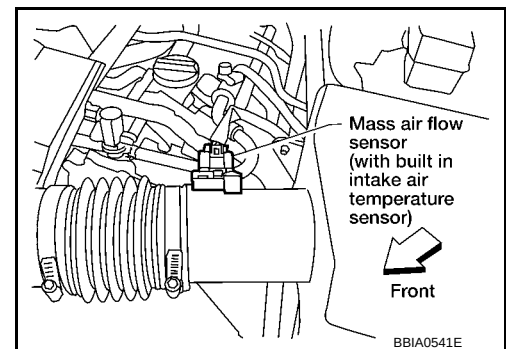
3. CLEAR THE SELF-LEARNING DATA.

④ With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0174 detected?
Is it difficult to start engine?

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0174 detected?
Is it difficult to start engine?

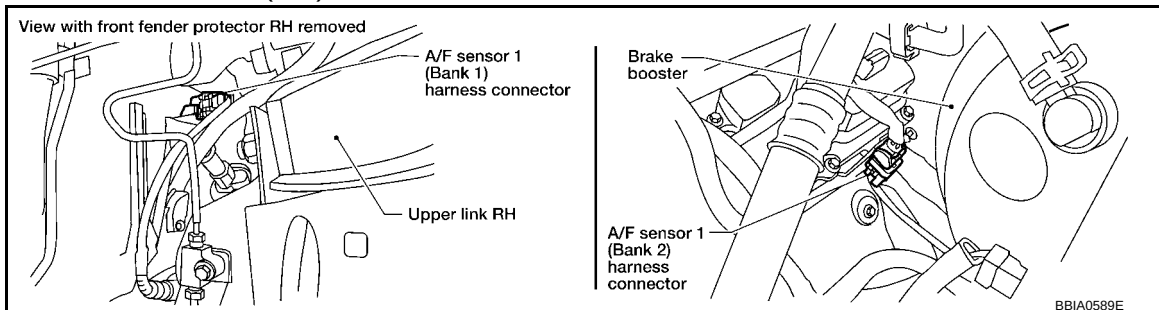


Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to [EC-209](#).
- No >> GO TO 4.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

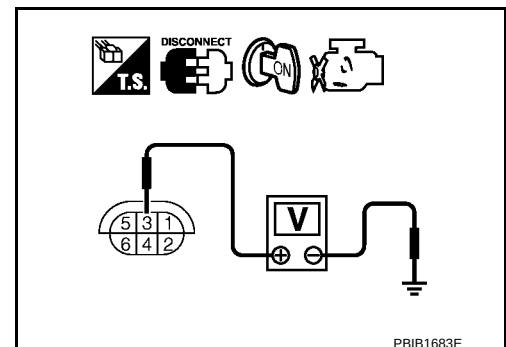


3. Turn ignition switch ON.
4. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

DTC P1273, P1283 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> GO TO 9.

8. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 9.

NG >> Repair or replace.

DTC P1273, P1283 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

9.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:0000000005448475

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

A
EC
C
D
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G
H
I
J
K
L
M
N
O
P

DTC P1274, P1284 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1274, P1284 A/F SENSOR 1

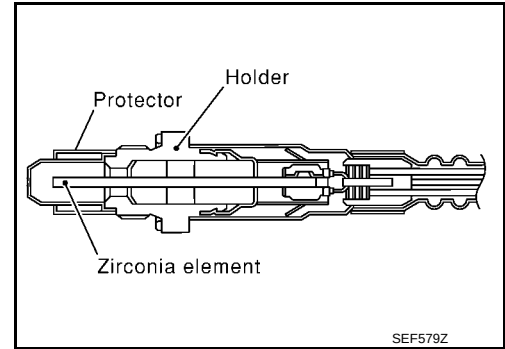
Component Description

INFOID:000000005448476

The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

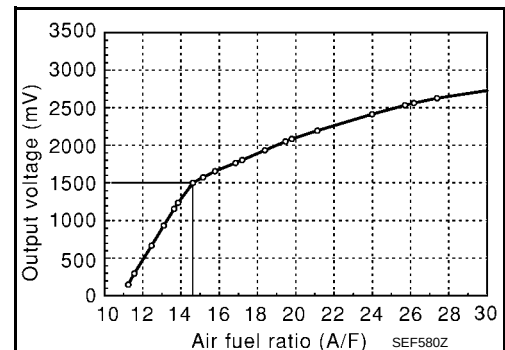
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



SEF579Z

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



SEF580Z

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448477

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448478

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1274 1274 (Bank 1) P1284 1244 (Bank 2)	Air fuel ratio (A/F) sensor 1 rich shift monitoring	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is shifted to the rich side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector

DTC Confirmation Procedure

INFOID:000000005448479

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

⑧ WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

DTC P1274, P1284 A/F SENSOR 1

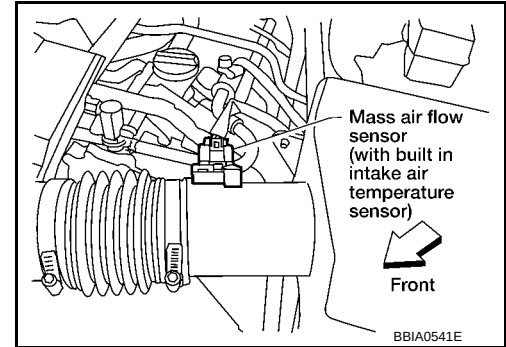
[VQ TYPE 1]

< SERVICE INFORMATION >

3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
4. Clear the self-learning coefficient by touching "CLEAR".
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to [EC-381. "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service \$03 with GST and make sure that DTC P0102 is detected.
7. Select Service \$04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service \$07 with GST.
If 1st trip DTC is detected, go to [EC-381. "Diagnosis Procedure"](#).



DTC P1274, P1284 A/F SENSOR 1

< SERVICE INFORMATION >

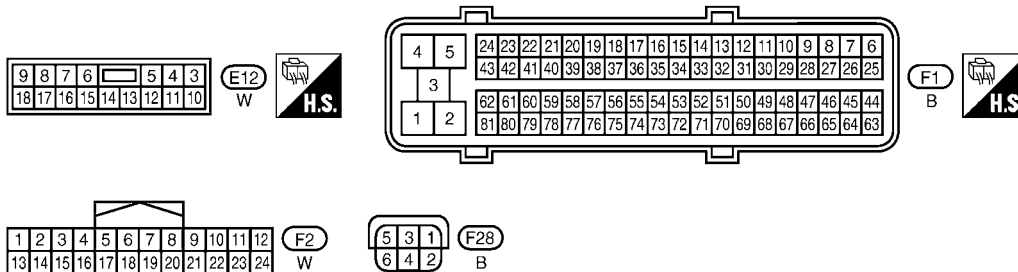
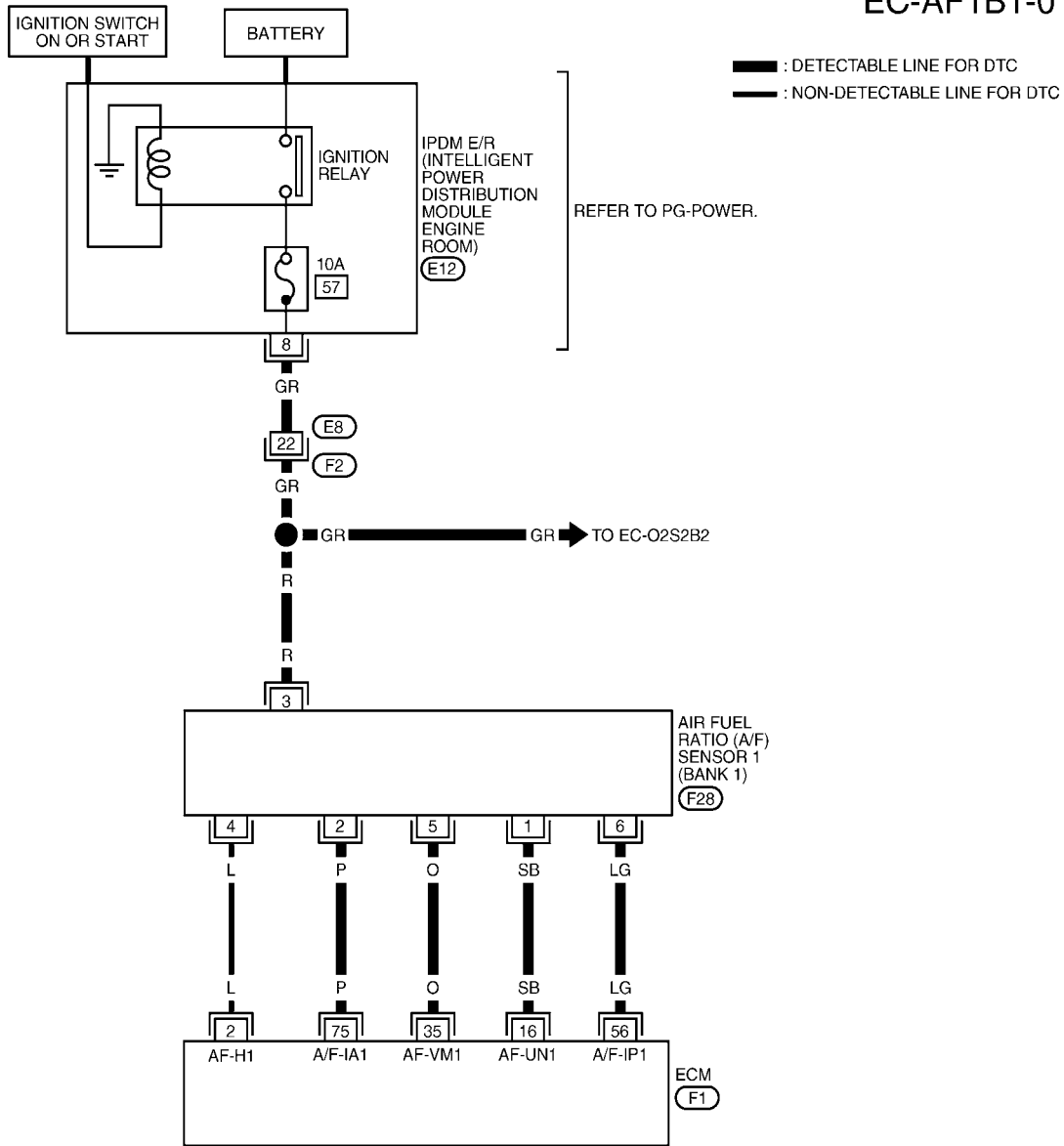
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448480

BANK 1

EC-AF1B1-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

CAUTION:

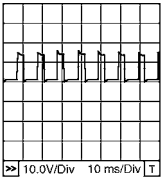
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1274, P1284 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

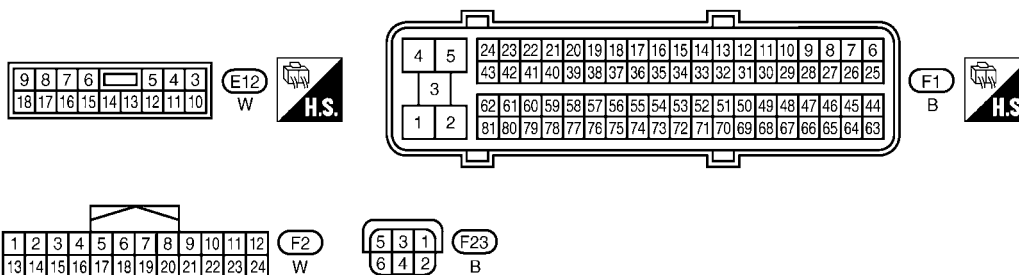
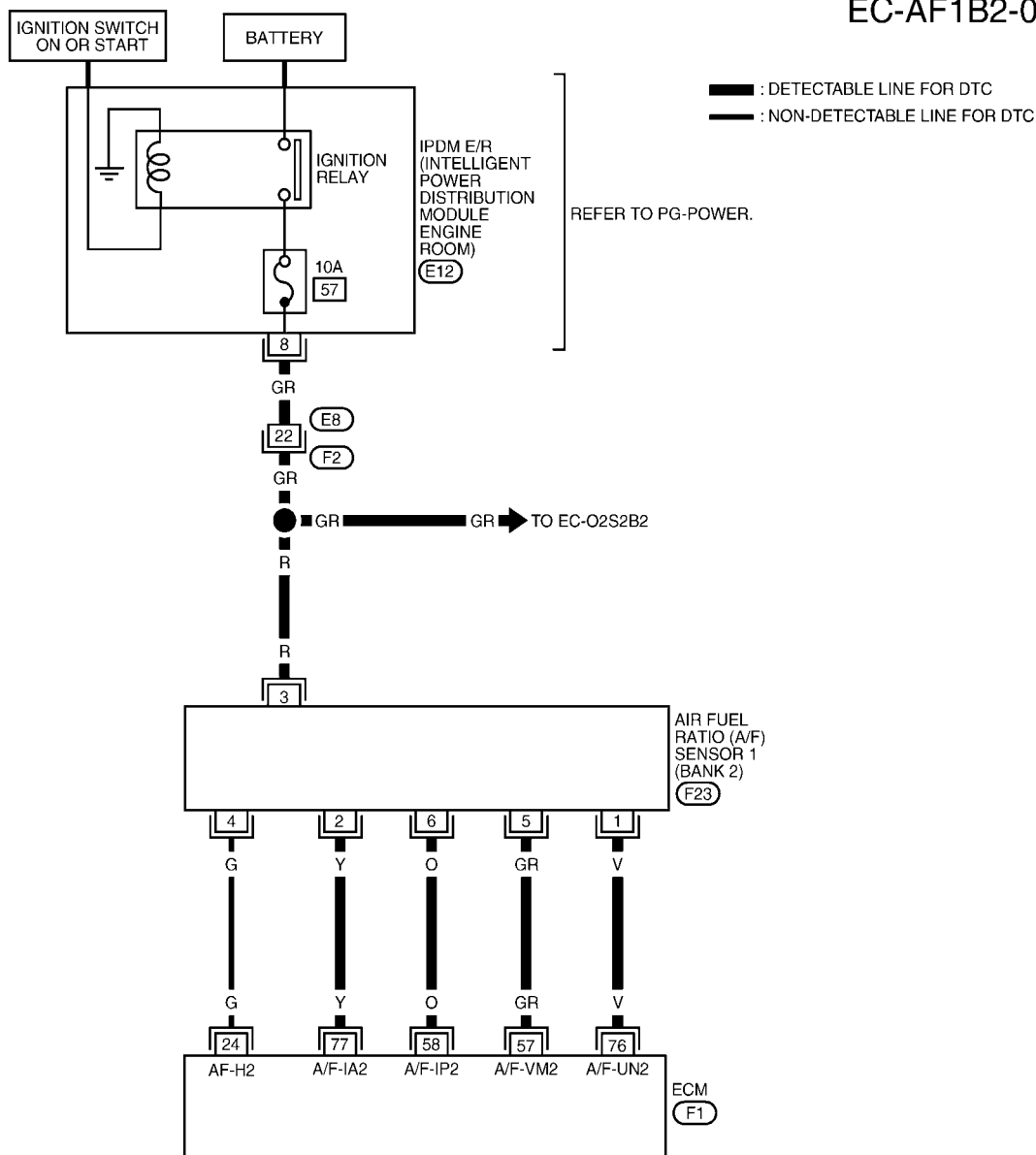
DTC P1274, P1284 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



JMBWA1218GB

Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

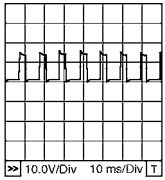
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1274, P1284 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

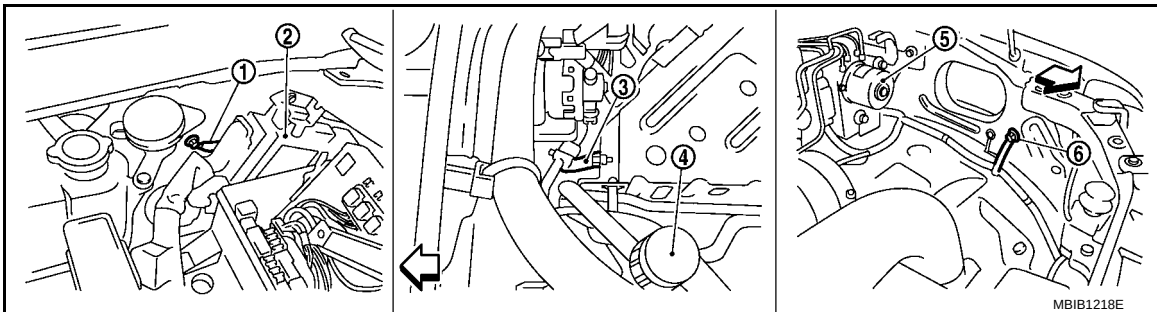
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448481

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

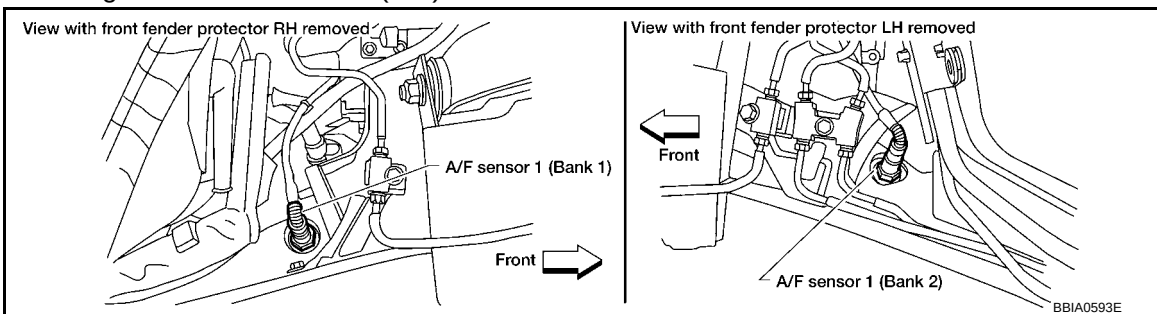
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



DTC P1274, P1284 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA.

⑧ With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected?

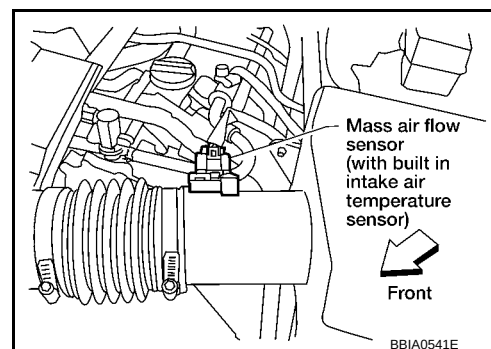
Is it difficult to start engine?

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected?

Is it difficult to start engine?



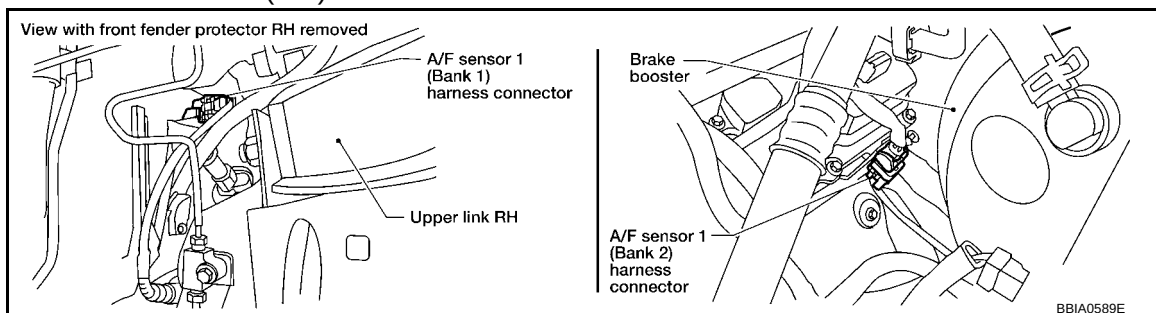
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172 or P0175. Refer to [EC-219](#).

No >> GO TO 4.

4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



3. Check harness connector for water.

Water should not exit.

OK or NG

OK >> GO TO 5.

NG >> Repair or replace harness connector.

5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

DTC P1274, P1284 A/F SENSOR 1

[VQ TYPE 1]

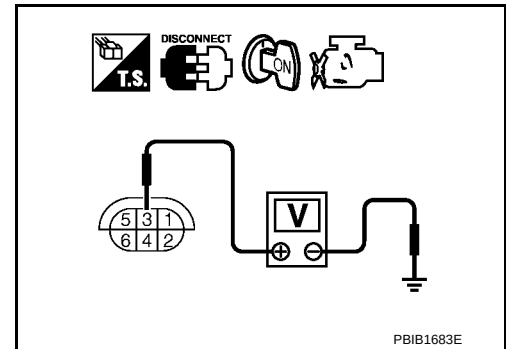
< SERVICE INFORMATION >

- Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

7. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.

DTC P1274, P1284 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> GO TO 10.

9.CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 10.

NG >> Repair or replace.

10.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448482

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1276, P1286 A/F SENSOR 1

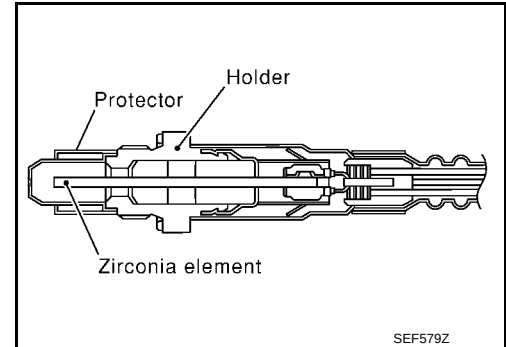
Component Description

INFOID:000000005448483

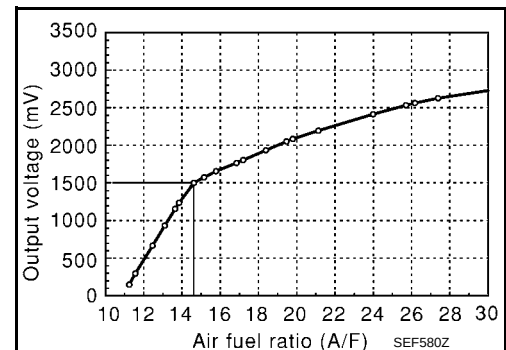
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448484

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448485

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276 (Bank 1) P1286 1286 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 1.5V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005448486

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

⑧ WITH CONSULT

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 1.5V and does not fluctuates, go to [EC-390. "Diagnosis Procedure"](#).
If the indication fluctuates around 1.5V, go to next step.
4. Select "A/F SEN1 (B1) P1276" or "A/F SEN1 (B2) P1286" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
5. Touch "START".
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,750 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position with "OD" OFF (A/T) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2.

7. Release accelerator pedal fully.
NOTE:
Never apply brake during releasing the accelerator pedal.
8. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", retry from step 6.
9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".
If "NG" is displayed, go to [EC-390. "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005448487

Use this procedure to check the overall function of the air fuel ratio (A/F) sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set D position with "OD" OFF (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
NOTE:
Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
If the DTC is displayed, go to [EC-390. "Diagnosis Procedure"](#).

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

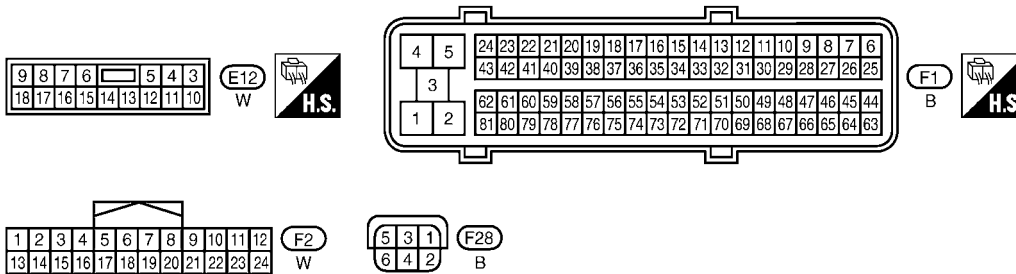
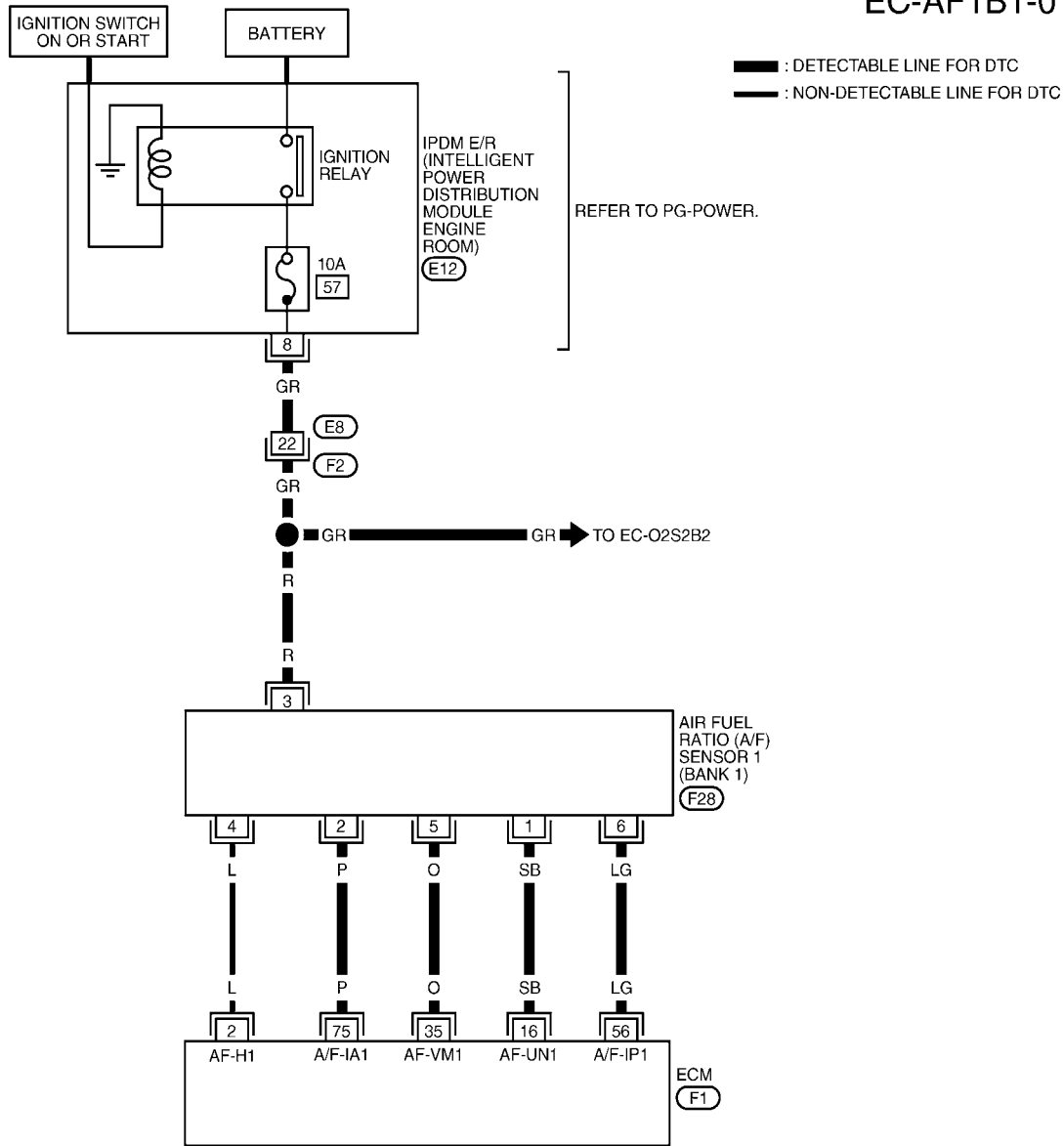
Wiring Diagram

INFOID:000000005448488

BANK 1

EC-AF1B1-01

EC



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

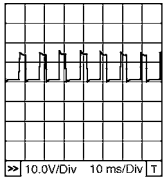
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

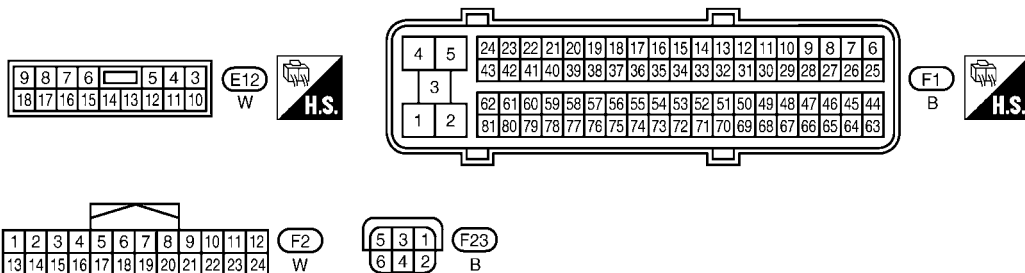
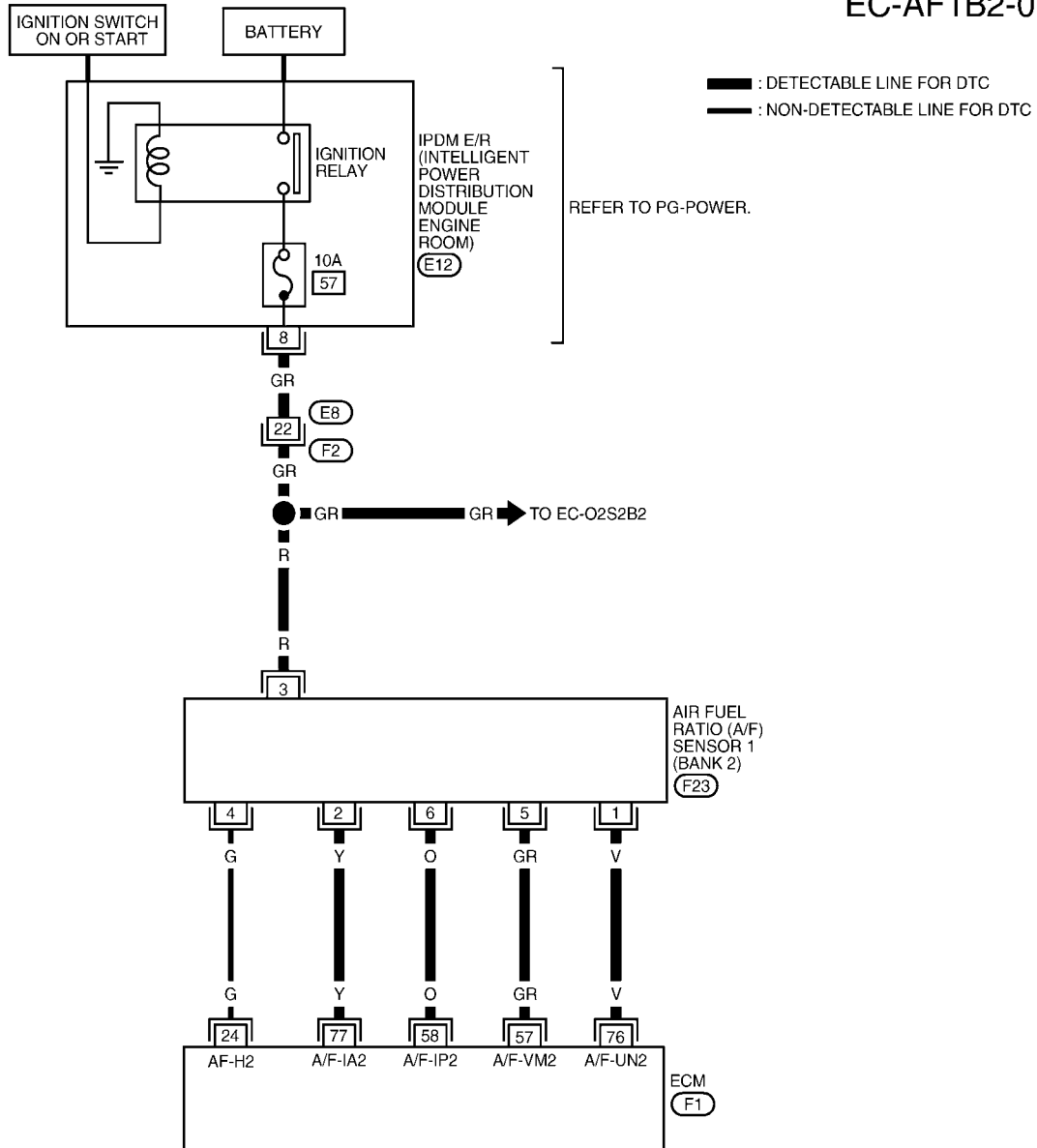
DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

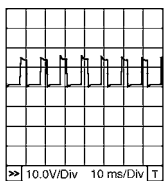
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1276, P1286 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

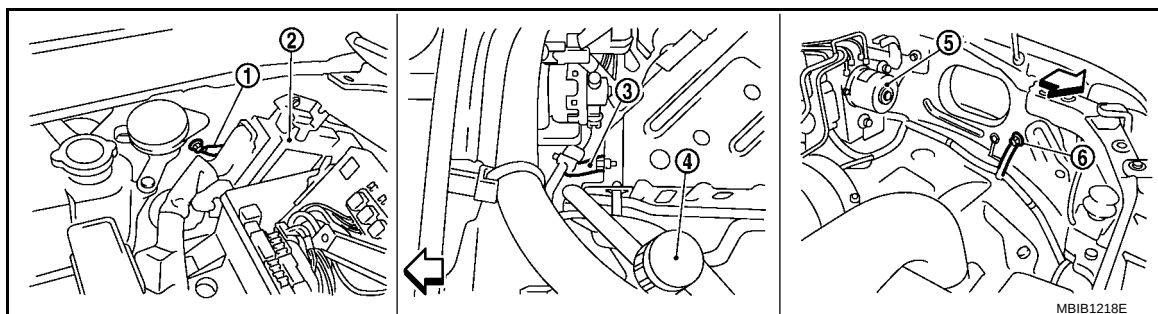
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448489

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



↩ : Vehicle front

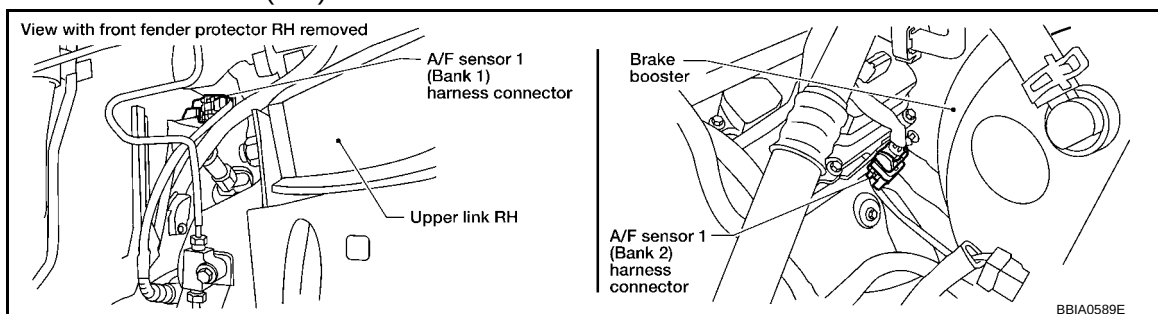
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.



- Turn ignition switch ON.

DTC P1276, P1286 A/F SENSOR 1

[VQ TYPE 1]

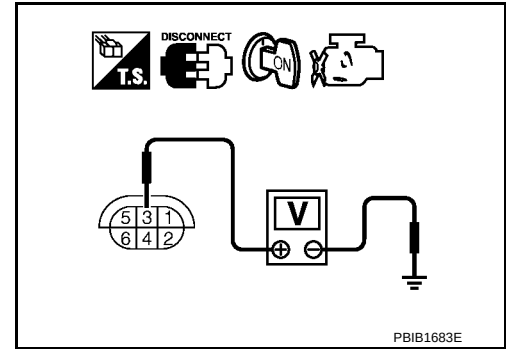
< SERVICE INFORMATION >

- Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

- Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1276, P1286 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448490

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

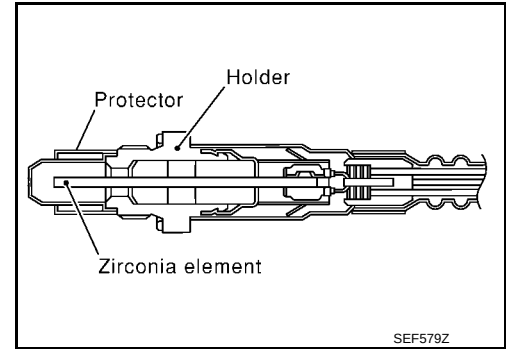
DTC P1278, P1288 A/F SENSOR 1

Component Description

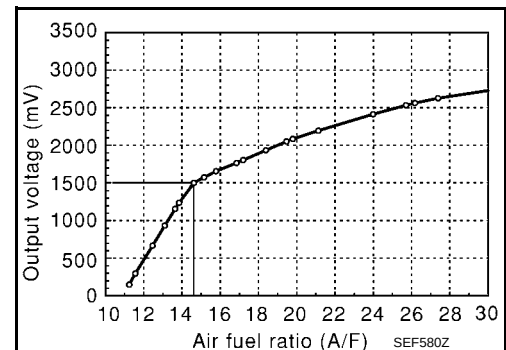
INFOID:000000005448491

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448492

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448493

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1278 1278 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit slow response	• The response (from RICH to LEAN) of the A/F signal computed by ECM from air fuel ratio (A/F) sensor 1 signal takes more than the specified time.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.)
P1288 1288 (Bank 2)			• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

DTC Confirmation Procedure

INFOID:000000005448494

NOTE:

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "A/F SEN1(B1) P1278/P1279" or "A/F SEN1(B1) P1288/P1289" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
6. Touch "START".
If "COMPLETED" appears on CONSULT screen, go to step 10.
If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7. After perform the following procedure, "TESTING" will be displayed on the CONSULT screen.
 - a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
 - b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
If "TESTING" is not displayed after 10 seconds, refer to [EC-132](#).
8. Wait for about 20 seconds at idle at under the condition that "TESTING" is displayed on the CONSULT screen.
9. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", refer to [EC-132](#).
10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".
If "NG" is displayed, go to [EC-398. "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.
Make sure that the total percentage should be within $\pm 15\%$.
If OK, go to the following step.
If NG, check the following.
 - Intake air leaks
 - Exhaust gas leaks
 - Incorrect fuel pressure
 - Lack of fuel
 - Fuel injector
 - Incorrect PCV hose connection
 - PCV valve
 - Mass air flow sensor
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service \$07 with GST.
If the 1st trip DTC is displayed, go to [EC-398. "Diagnosis Procedure"](#).

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

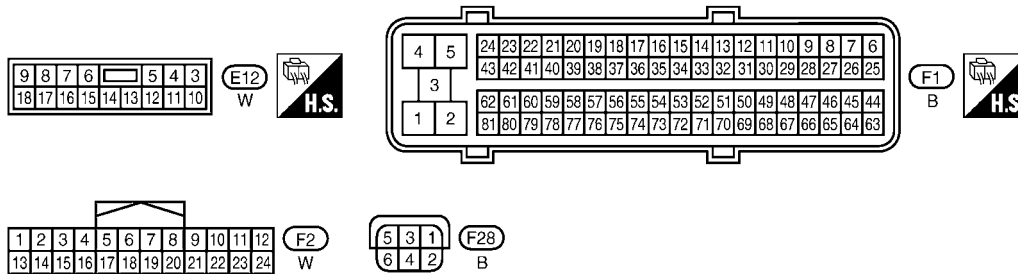
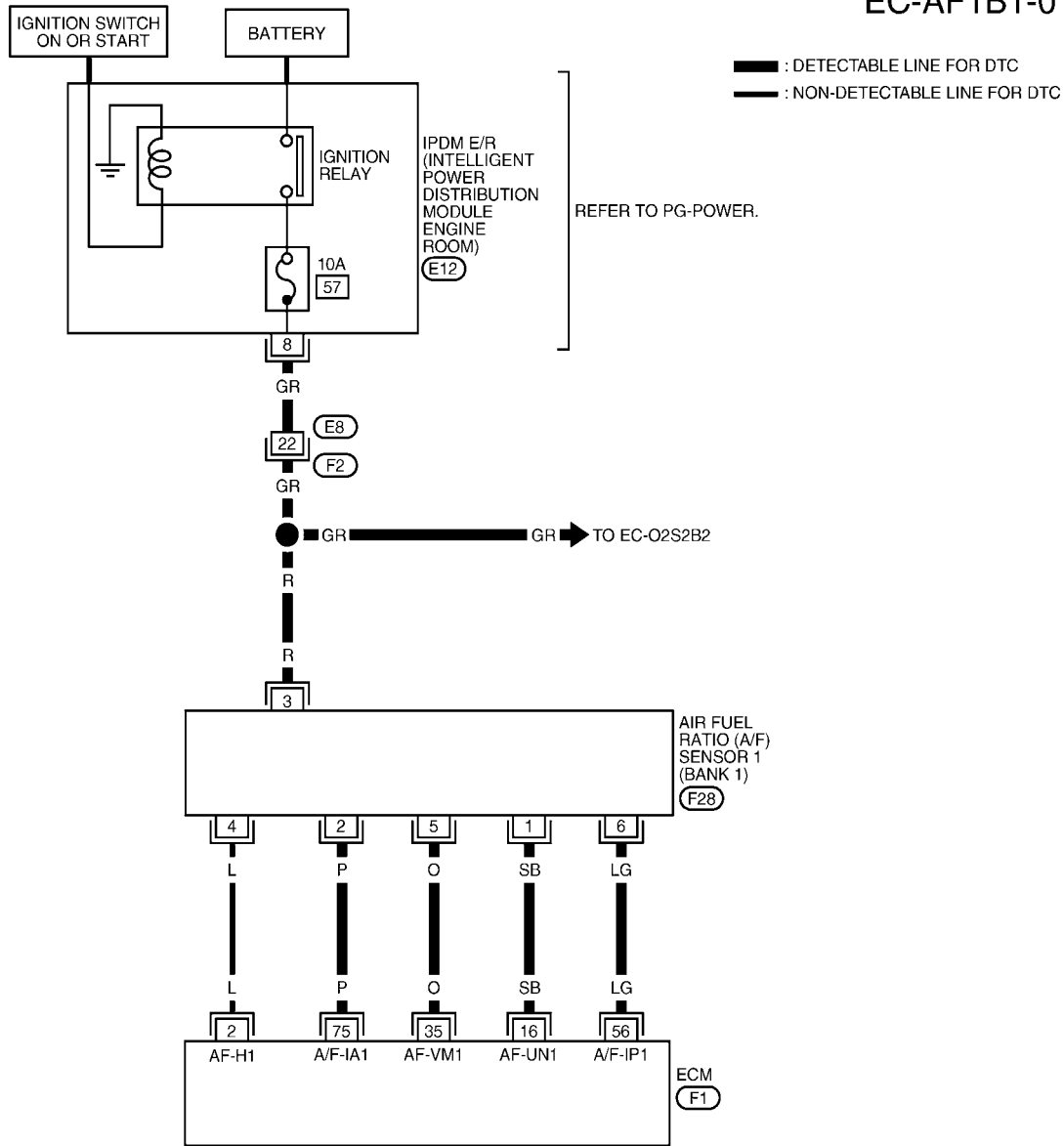
Wiring Diagram

INFOID:000000005448495

BANK 1

EC-AF1B1-01

EC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

CAUTION:

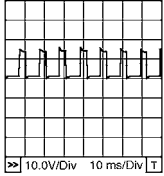
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

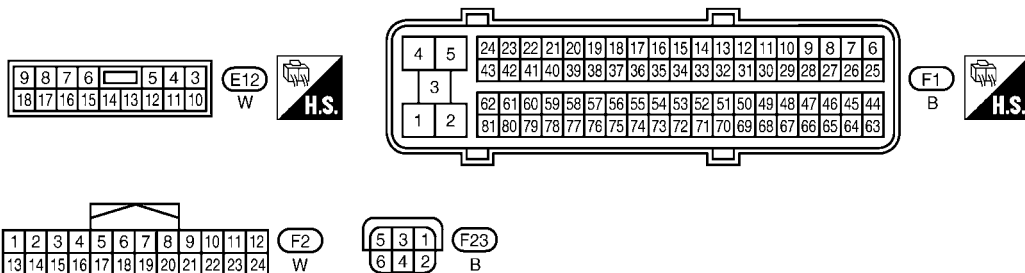
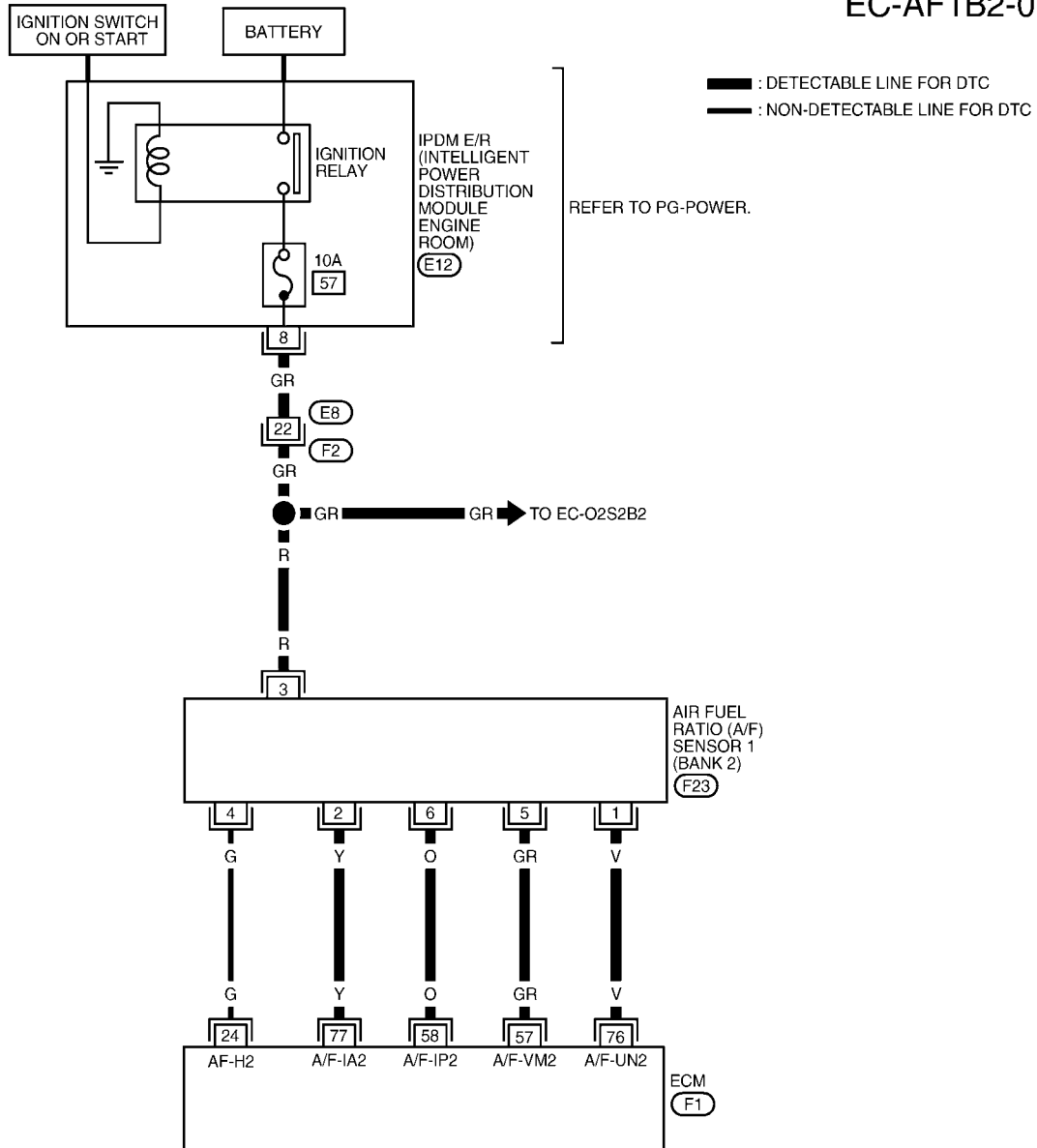
DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

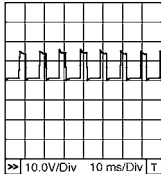
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

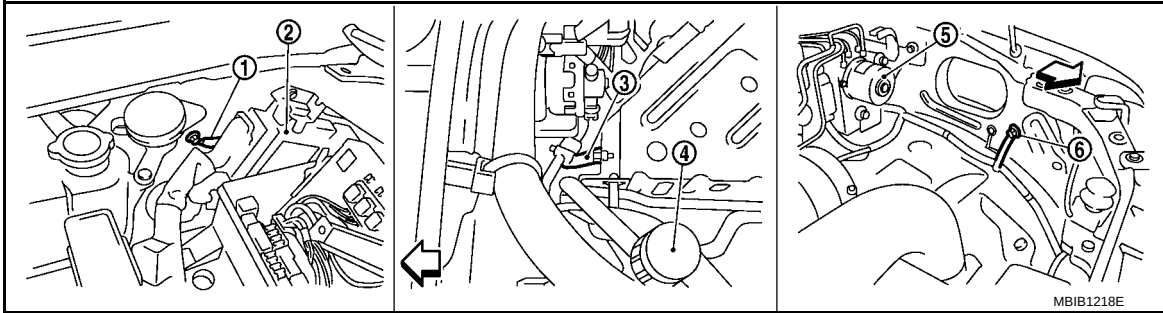
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448496

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

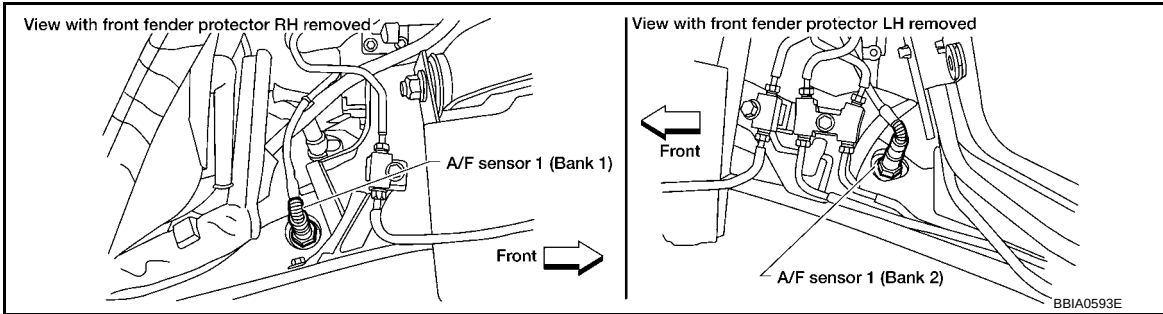
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

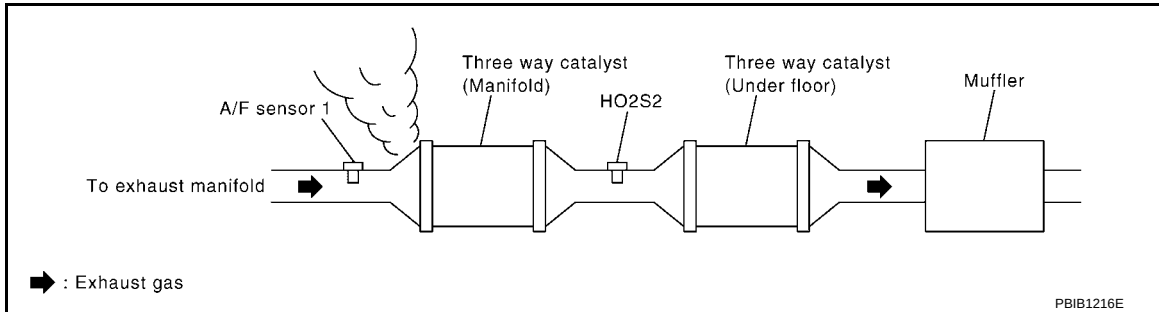
[VQ TYPE 1]

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace.

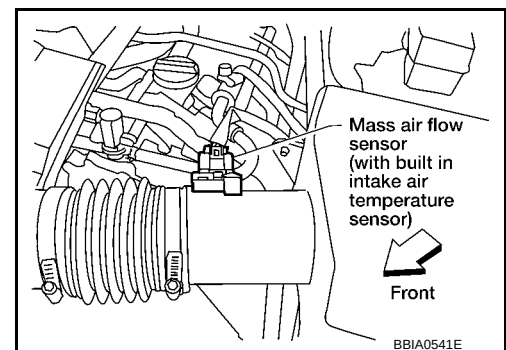
5.CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
 3. Clear the self-learning control coefficient by touching "CLEAR" or "START".
 4. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?**

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch OFF.
 3. Disconnect mass air flow sensor harness connector.
 4. Restart engine and let it idle for at least 5 seconds.
 5. Stop engine and reconnect mass air flow sensor harness connector.
 6. Make sure DTC P0102 is displayed.
 7. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
 8. Make sure DTC P0000 is displayed.
 9. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?**



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-209](#) or [EC-219](#).
No >> GO TO 6.

6.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

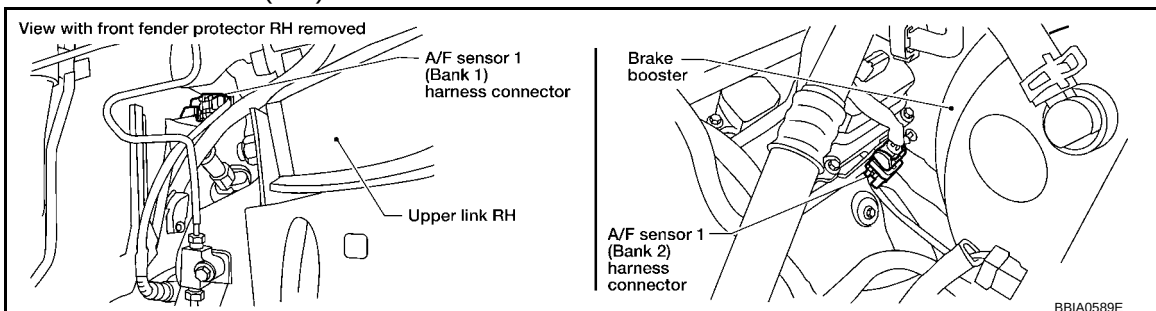
1. Turn ignition switch OFF.

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

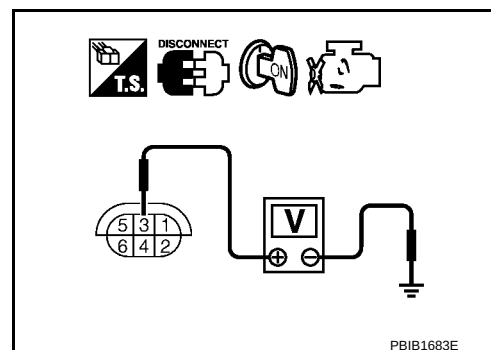


3. Turn ignition switch ON.
4. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.



7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

8.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal

DTC P1278, P1288 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

A

EC

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162. "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-168. "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to [EC-49](#).

OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448497

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

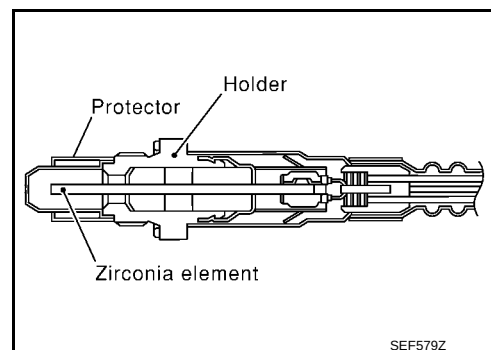
DTC P1279, P1289 A/F SENSOR 1

Component Description

INFOID:000000005448498

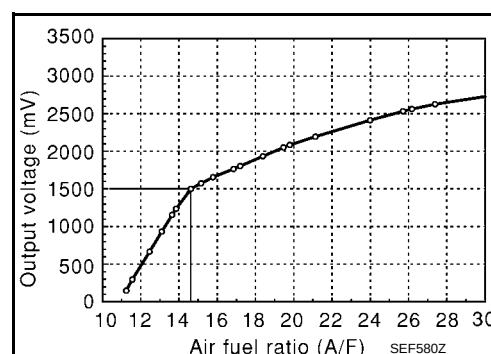
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



SEF579Z

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



SEF580Z

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448499

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448500

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1279 1279 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit slow response	• The response (from LEAN to RICH) of the A/F signal computed by ECM from air fuel ratio (A/F) sensor 1 signal takes more than the specified time.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor
P1289 1289 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448501

NOTE:

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "A/F SEN1(B1) P1278/P1279" or "A/F SEN1(B1) P1288/P1289" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
6. Touch "START".
If "COMPLETED" appears on CONSULT screen, go to step 10.
If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7. After perform the following procedure, "TESTING" will be displayed on the CONSULT screen.
 - a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
 - b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
If "TESTING" is not displayed after 10 seconds, refer to EC-132.
8. Wait for about 20 seconds at idle at under the condition that "TESTING" is displayed on the CONSULT screen.
9. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", refer to EC-132.
10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".
If "NG" is displayed, go to [EC-407. "Diagnosis Procedure"](#).

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.
Make sure that the total percentage should be within $\pm 15\%$.
If OK, go to the following step.
If NG, check the following.
 - Intake air leaks
 - Exhaust gas leaks
 - Incorrect fuel pressure
 - Lack of fuel
 - Fuel injector
 - Incorrect PCV hose connection
 - PCV valve
 - Mass air flow sensor
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service \$07 with GST.
If the 1st trip DTC is displayed, go to [EC-407. "Diagnosis Procedure"](#).

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

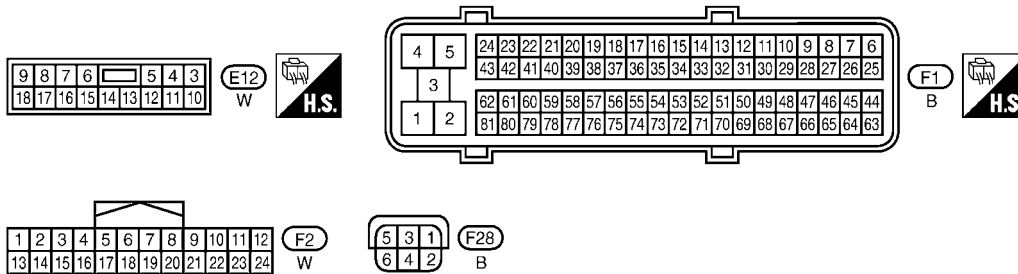
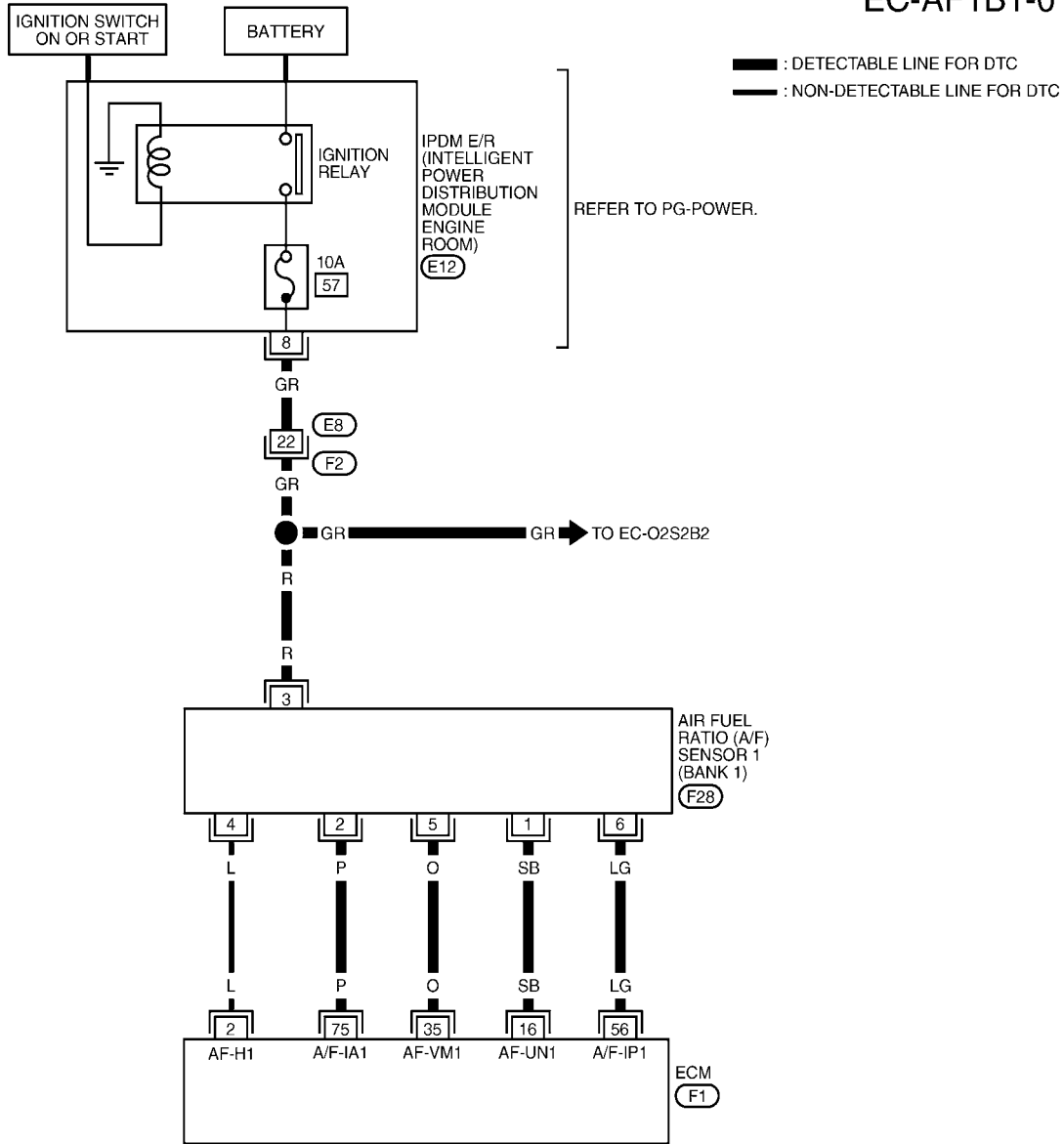
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448502

BANK 1

EC-AF1B1-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

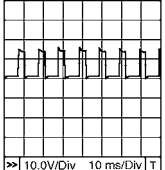
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1217GB

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

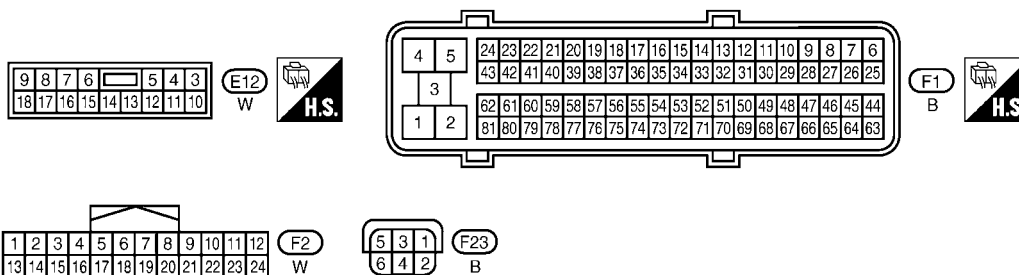
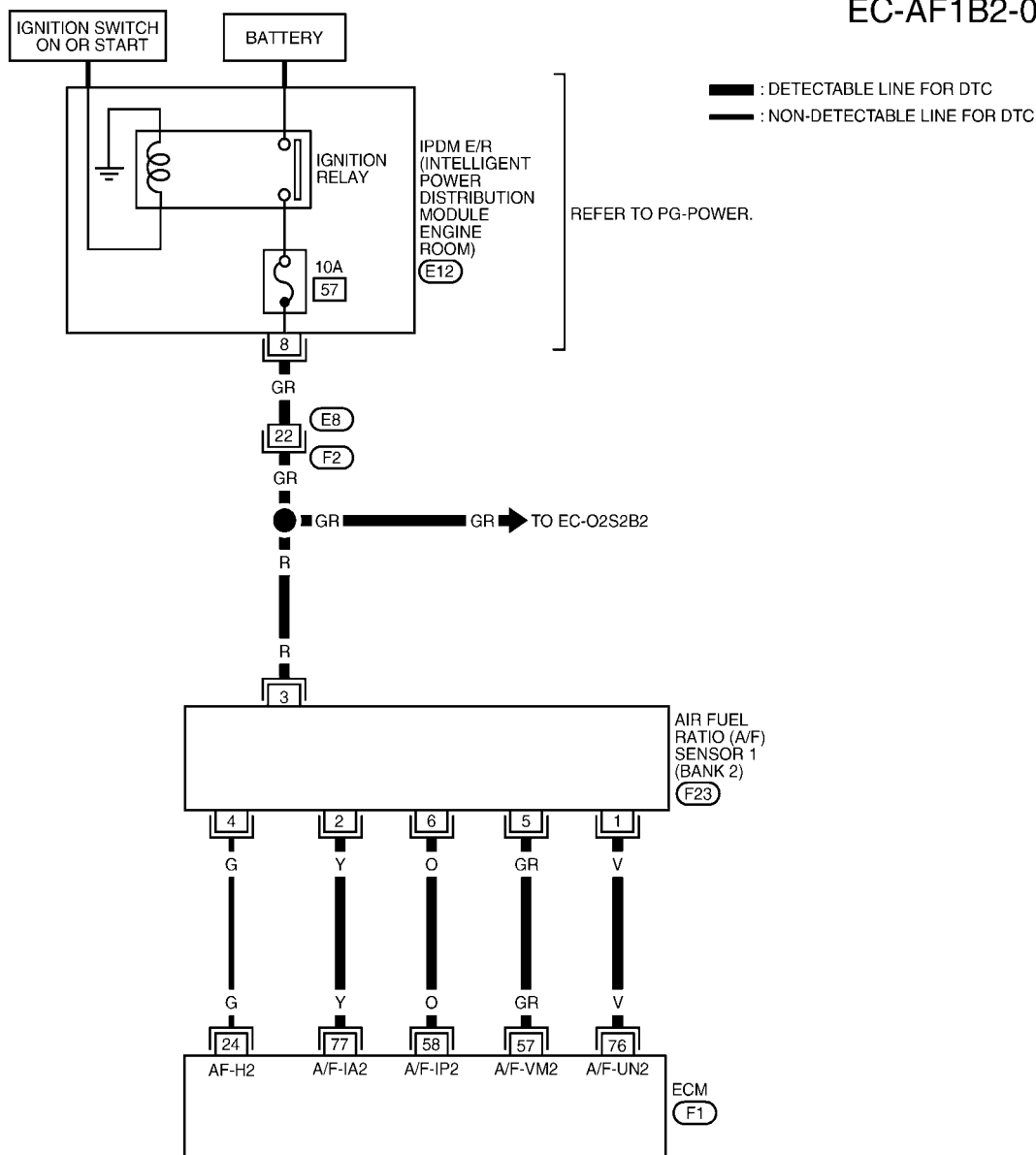
DTC P1279, P1289 A/F SENSOR 1

[VQ TYPE 1]

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



JMBWA1218GB

Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

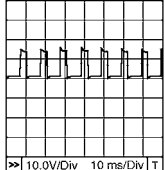
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

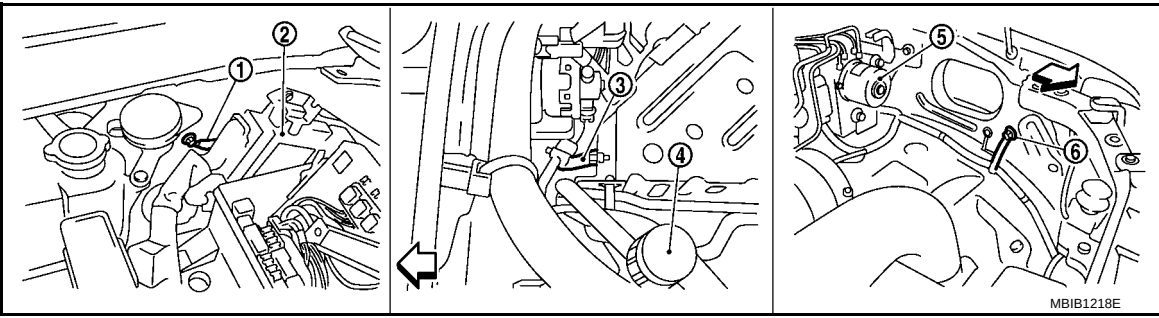
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448503

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



← : Vehicle front

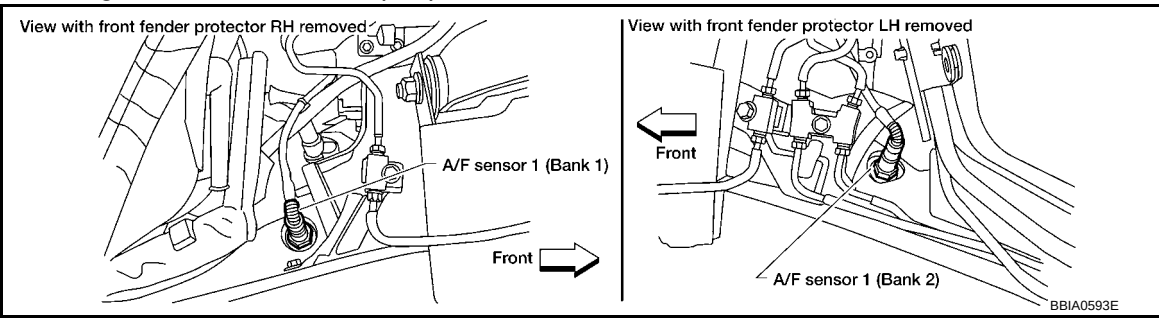
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

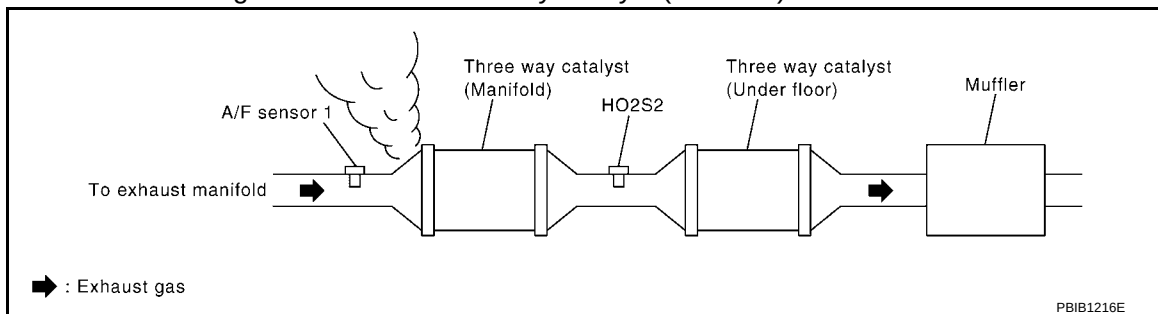
[VQ TYPE 1]

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace.

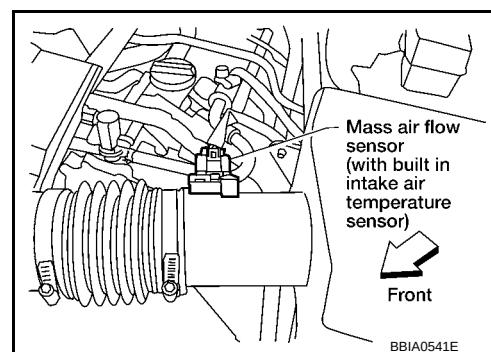
5. CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
 3. Clear the self-learning control coefficient by touching "CLEAR" or "START".
 4. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?**

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch OFF.
 3. Disconnect mass air flow sensor harness connector.
 4. Restart engine and let it idle for at least 3 seconds.
 5. Stop engine and reconnect mass air flow sensor harness connector.
 6. Make sure DTC P0102 is displayed.
 7. Erase the DTC memory. Refer to [EC-53, "Emission-related Diagnostic Information"](#).
 8. Make sure DTC P0000 is displayed.
 9. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
Is it difficult to start engine?**



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-209](#) or [EC-219](#).
No >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

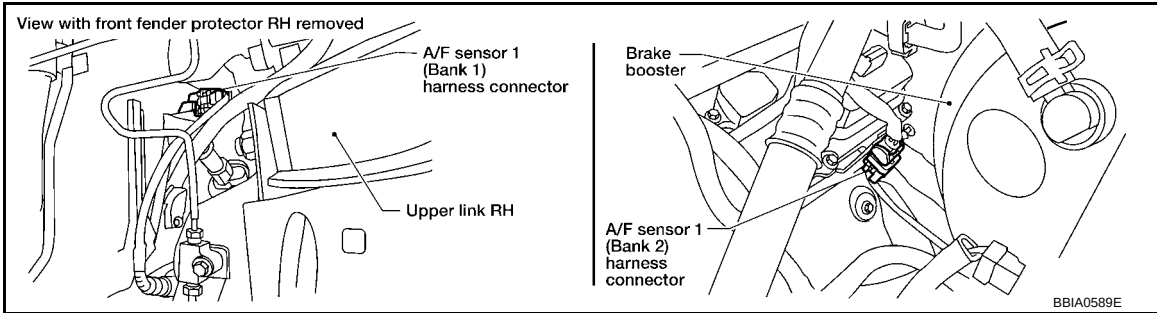
1. Turn ignition switch OFF.

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

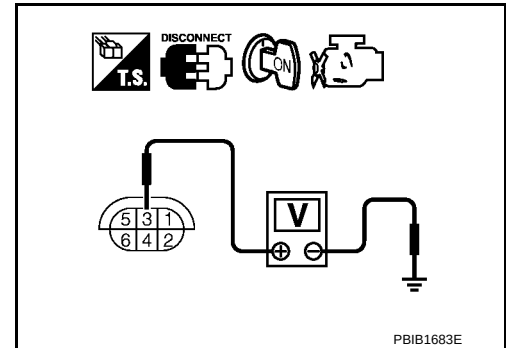


3. Turn ignition switch ON.
4. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.



7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

8.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal

DTC P1279, P1289 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 1]

1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-168, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to [EC-49](#).

OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform [EC-140](#).

OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000005448504

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#)

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

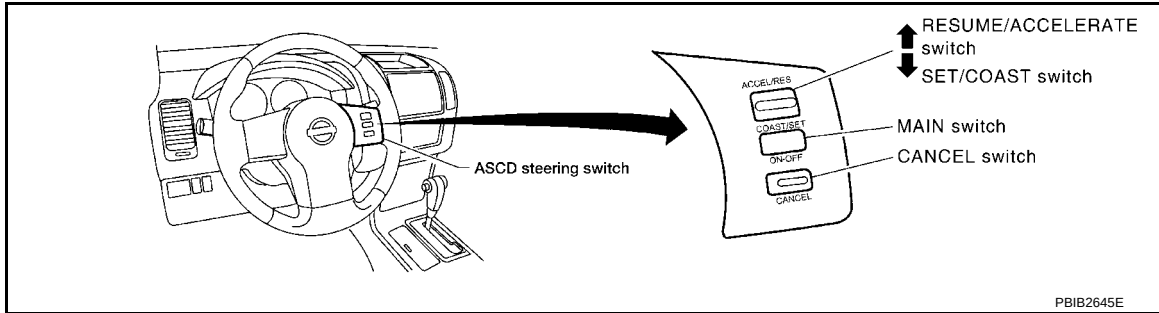
[VQ TYPE 1]

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:000000005448505

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to [EC-42](#) for the ASCD function.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448506

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

INFOID:000000005448507

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-274](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	- An excessively high voltage signal from the ASCD steering switch is sent to ECM. - ECM detects that input signal from the ASCD steering switch is out of the specified range. - ECM detects that the ASCD steering switch is stuck ON.	- Harness or connectors (The switch circuit is open or shorted.) - ASCD steering switch - ECM

DTC Confirmation Procedure

INFOID:000000005448508

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Ⓟ WITH CONSULT

1. Turn ignition switch ON.

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.
8. If DTC is detected, go to [EC-414, "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

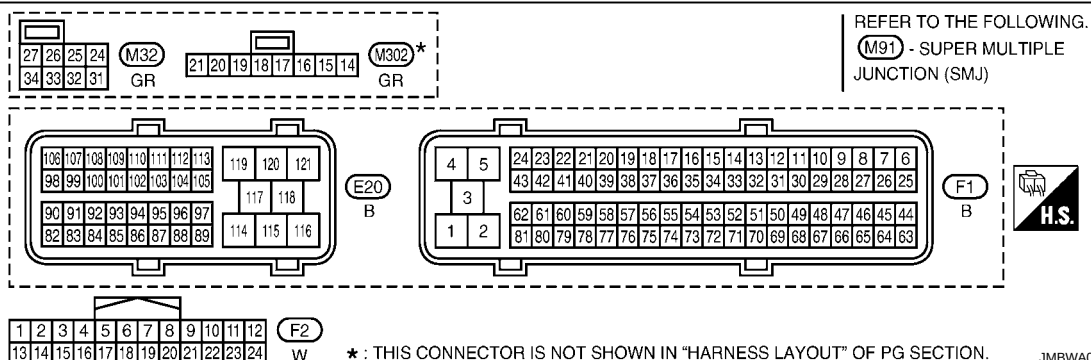
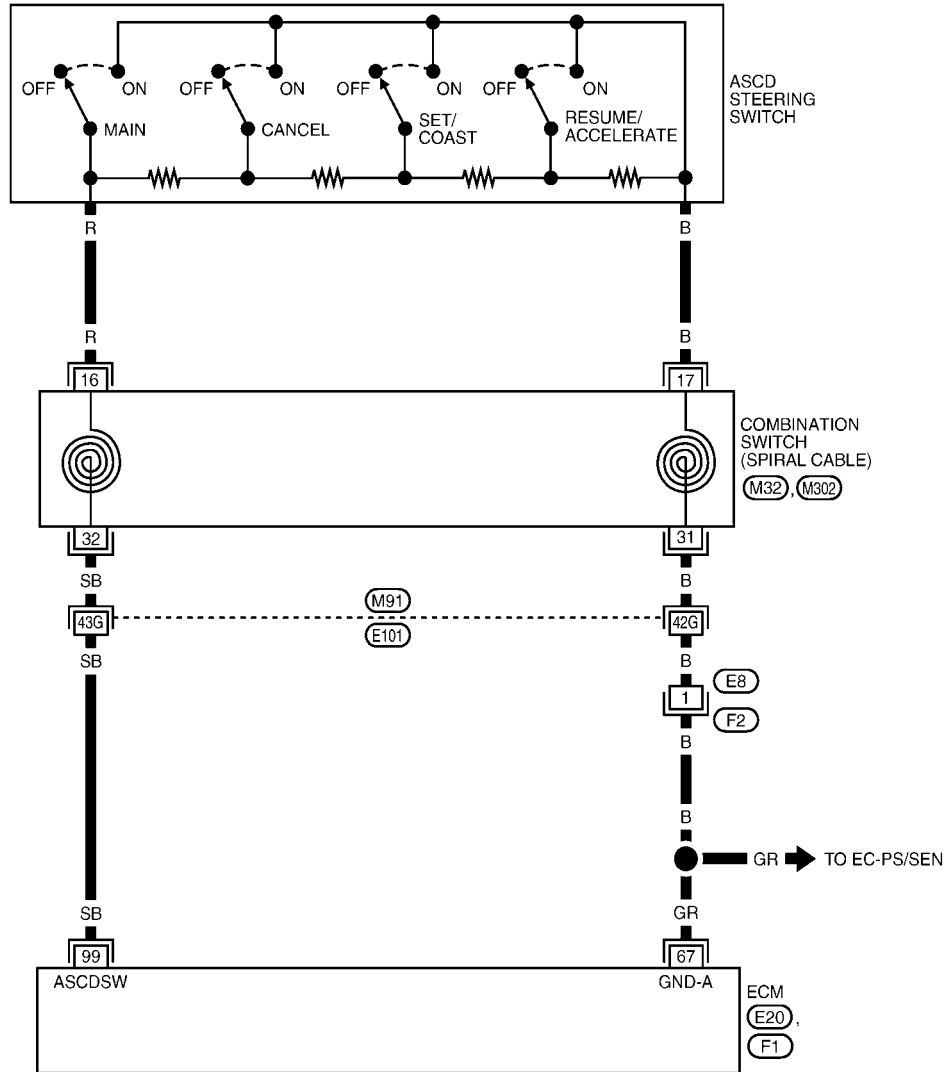
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448509

EC-ASC/SW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

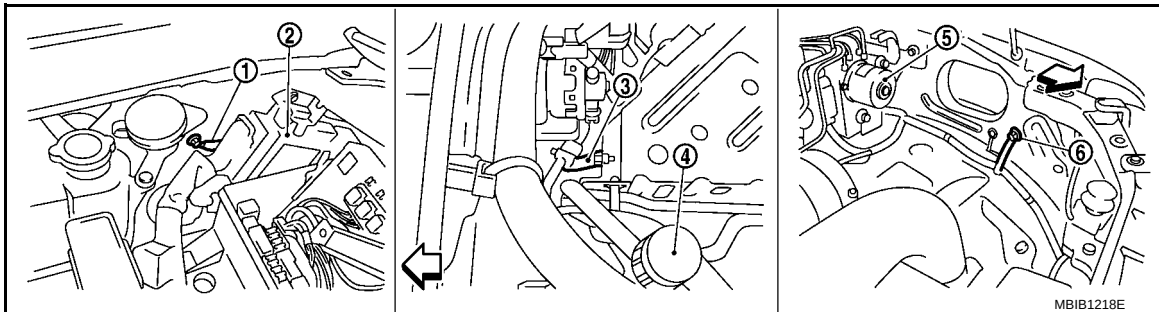
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
99	SB	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V

Diagnosis Procedure

INFOID:000000005448510

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



↖ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 1]

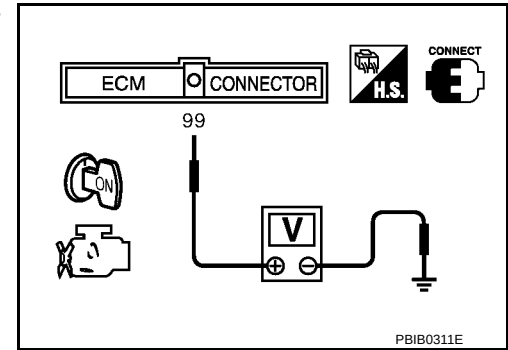
< SERVICE INFORMATION >

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

⊗ Without CONSULT

- Turn ignition switch ON.
- Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

- OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect combination switch harness connector.
- Disconnect ECM harness connector.
- Check harness continuity between combination switch terminal 18 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Check harness continuity between ECM terminal 99 and combination switch terminal 19. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD STEERING SWITCH

Refer to [EC-416, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
NG >> Replace steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-140, "Description"](#).

>> **INSPECTION END**

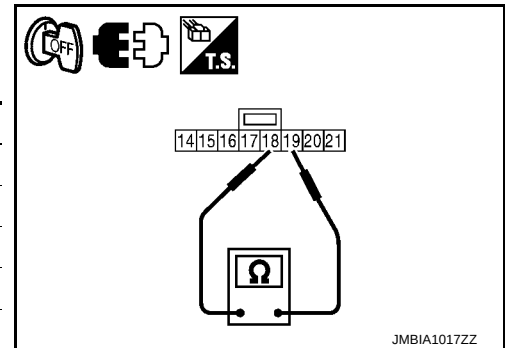
Component Inspection

INFOID:000000005448511

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M302.
2. Check continuity between combination switch (spiral cable) terminals 18 and 19 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

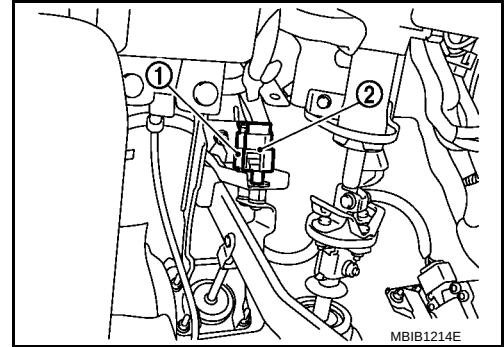
[VQ TYPE 1]

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:000000005448512

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-42](#) for the ASCD function.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448513

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000005448514

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

- If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-274](#)
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

INFOID:000000005448515

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:

Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator lights up.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-420, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the following step.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-420, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1572 ASCD BRAKE SWITCH

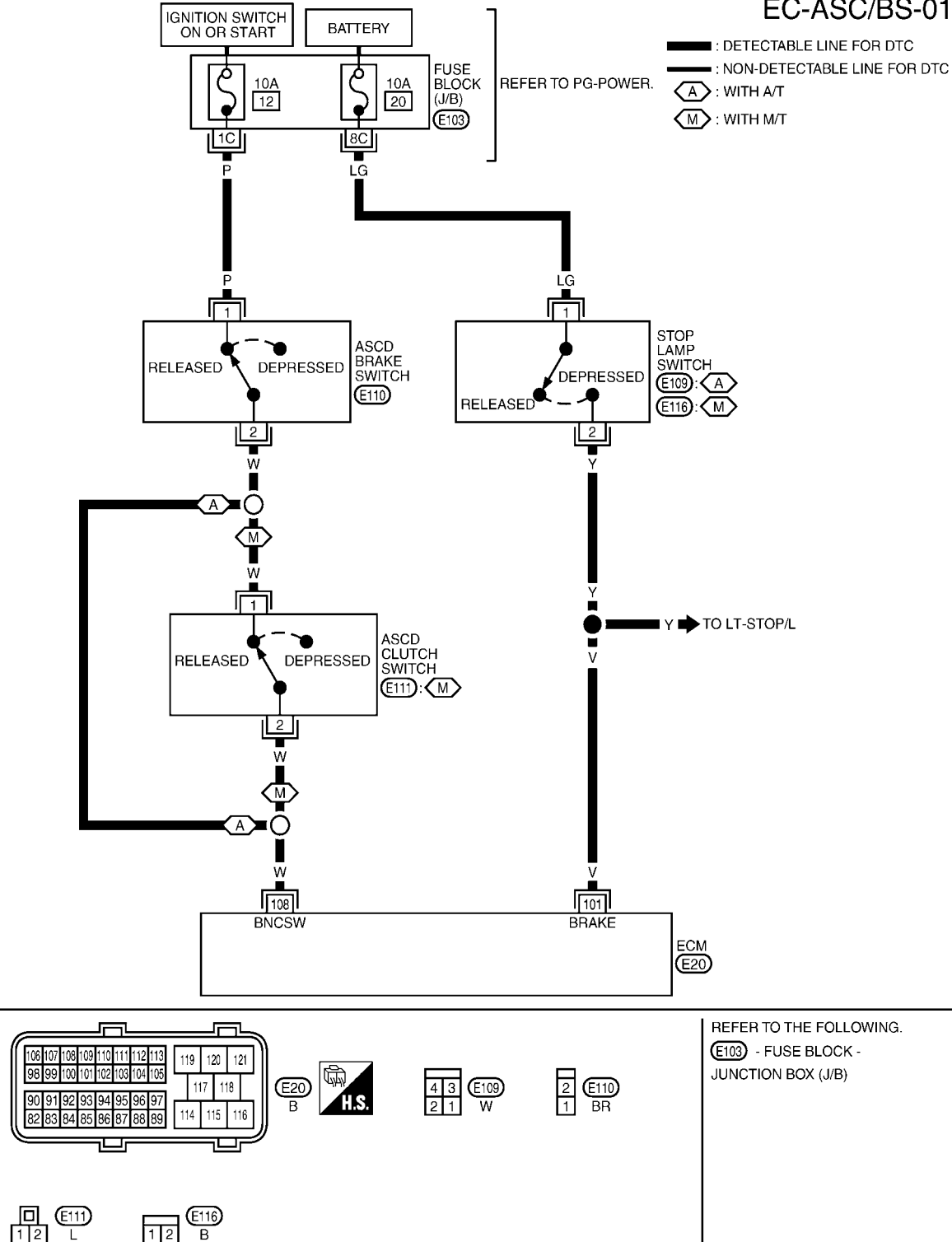
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448516

EC-ASC/BS-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0493GB

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448517

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

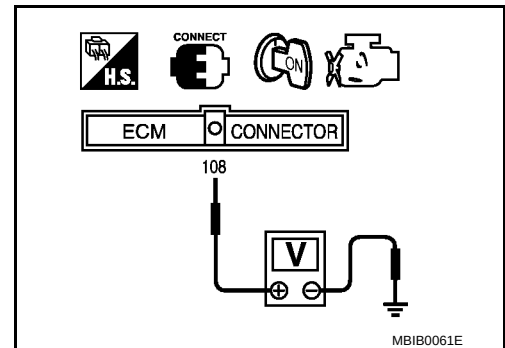
With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.



DTC P1572 ASCD BRAKE SWITCH

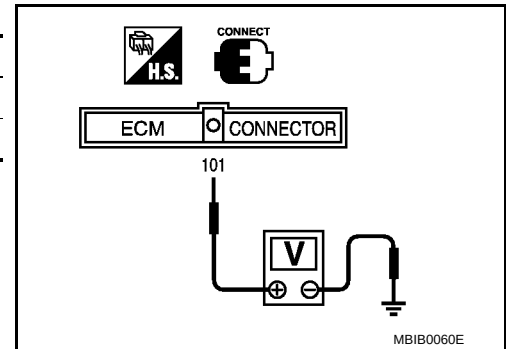
< SERVICE INFORMATION >

[VQ TYPE 1]

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

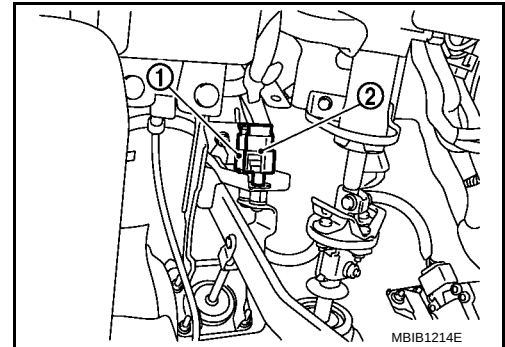
OK or NG

- OK >> GO TO 11.
- NG >> GO TO 7.



3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
 - Stop lamp switch (2)
3. Turn ignition switch ON.

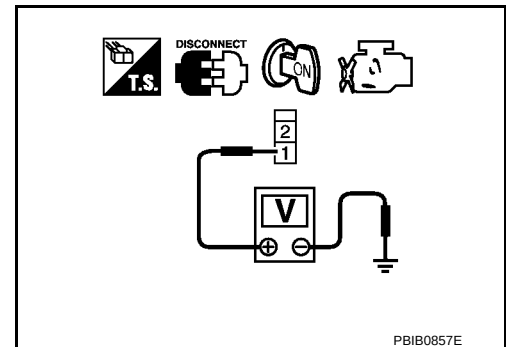


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

6. CHECK ASCD BRAKE SWITCH

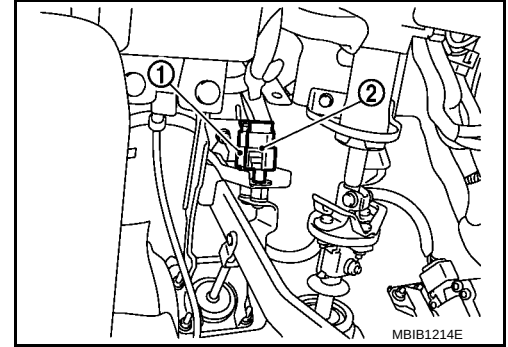
Refer to [EC-426. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

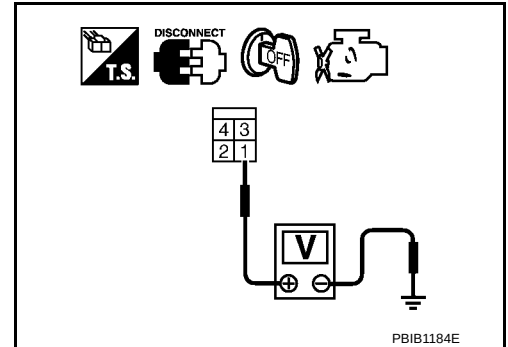


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to [EC-426. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace stop lamp switch.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

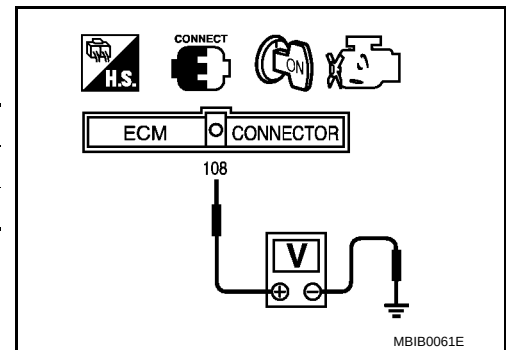
1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

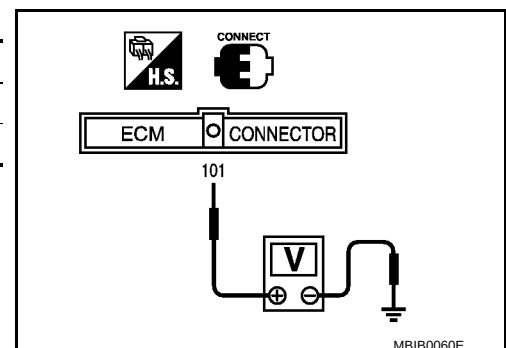
Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

OK or NG

- OK >> GO TO 14.
NG >> GO TO 10.



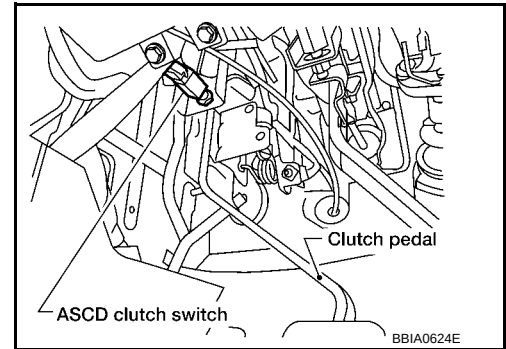
DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

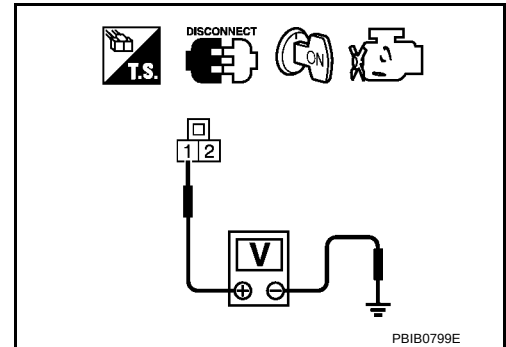


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

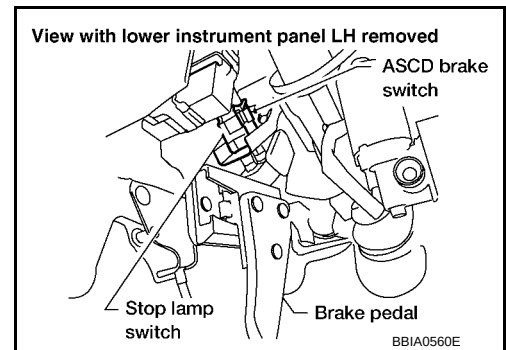
OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

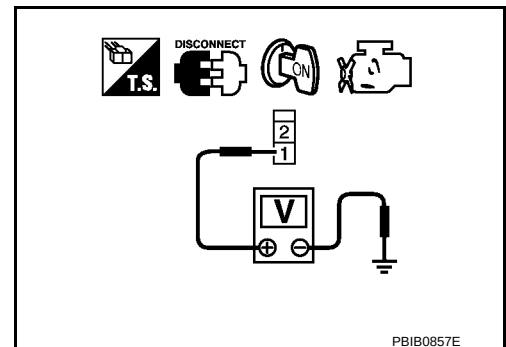


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

>> Repair open circuit or short to ground in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to [EC-426, "Component Inspection"](#).

OK or NG

OK >> GO TO 14.

NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

Refer to [EC-426, "Component Inspection"](#).

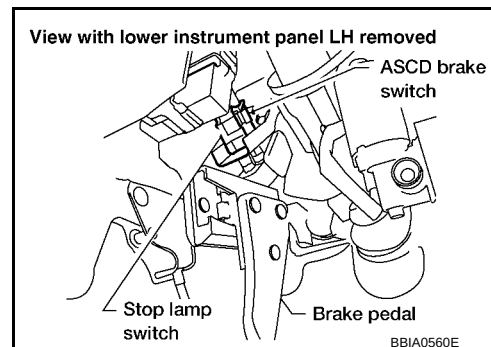
OK or NG

OK >> GO TO 14.

NG >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



DTC P1572 ASCD BRAKE SWITCH

[VQ TYPE 1]

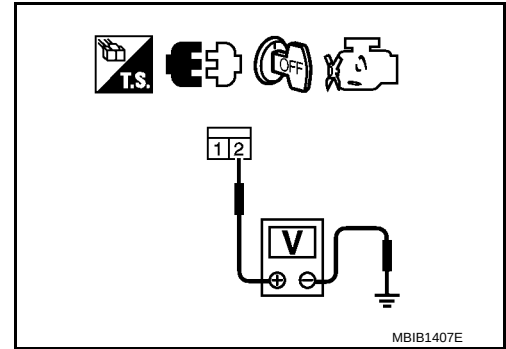
< SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 12.
NG >> GO TO 11.



11.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK STOP LAMP SWITCH

Refer to [EC-426, "Component Inspection"](#).

OK or NG

- OK >> GO TO 14.
NG >> Replace stop lamp switch.

14.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448518

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

DTC P1572 ASCD BRAKE SWITCH

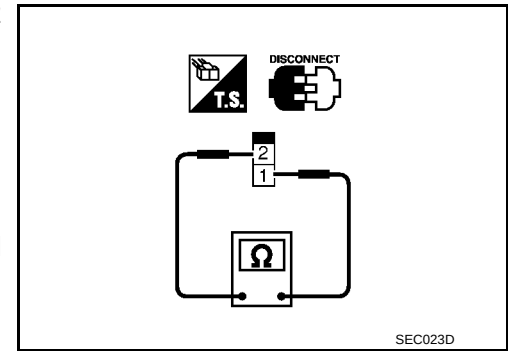
[VQ TYPE 1]

< SERVICE INFORMATION >

- Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to [BR-5](#), and perform step 3 again.

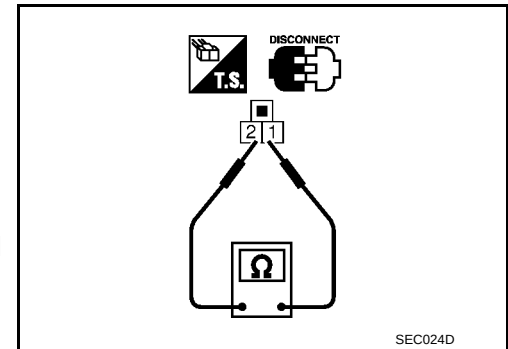


ASCD CLUTCH SWITCH

- Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

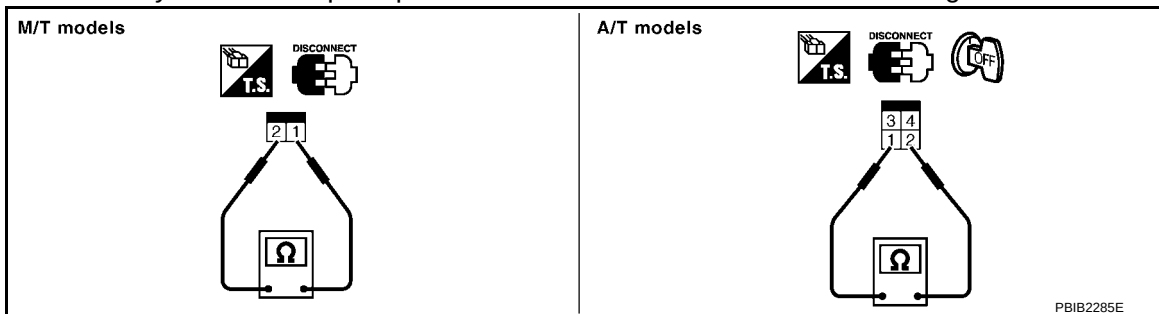
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to [CL-6](#), and perform step 3 again.



STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1574 ASCD VEHICLE SPEED SENSOR

Component Description

INFOID:000000005448519

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to [EC-42](#) for ASCD functions.

On Board Diagnosis Logic

INFOID:000000005448520

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

- If DTC P1574 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-267](#).
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-274](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (A/T models) • ECM

DTC Confirmation Procedure

INFOID:000000005448521

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
3. Check DTC.
4. If DTC is detected, go to [EC-428, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

Diagnosis Procedure

INFOID:000000005448522

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-48](#).

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

DTC P1574 ASCD VEHICLE SPEED SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

Refer to [BRC-10. "Fail-Safe Function"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.CHECK COMBINATION METER

Refer to [DI-4](#).

>> **INSPECTION END**

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P

DTC P1706 PNP SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

DTC P1706 PNP SWITCH

Component Description

INFOID:000000005448523

When the selector lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) signal is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448524

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

INFOID:000000005448525

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] • Park/neutral position (PNP) switch (M/T models) • Combination meter • TCM (A/T models)

DTC Confirmation Procedure

INFOID:000000005448526

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF

If NG, go to [EC-433, "Diagnosis Procedure"](#).

If OK, go to following step.

3. Select "DATA MONITOR" mode with CONSULT.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-433, "Diagnosis Procedure"](#).

DTC P1706 PNP SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

Overall Function Check

INFOID:000000005448527

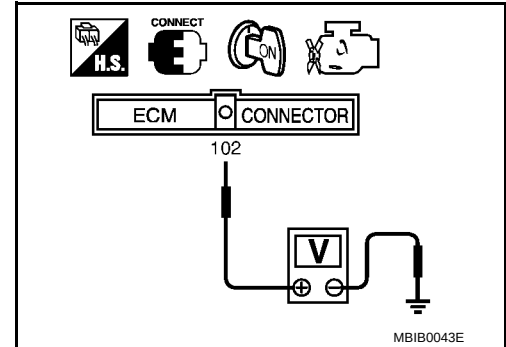
Use this procedure to check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP signal) and ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to [EC-433. "Diagnosis Procedure"](#).



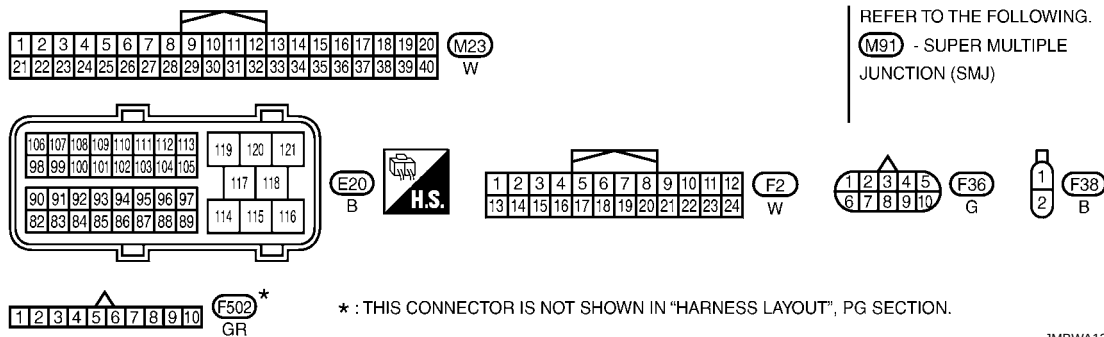
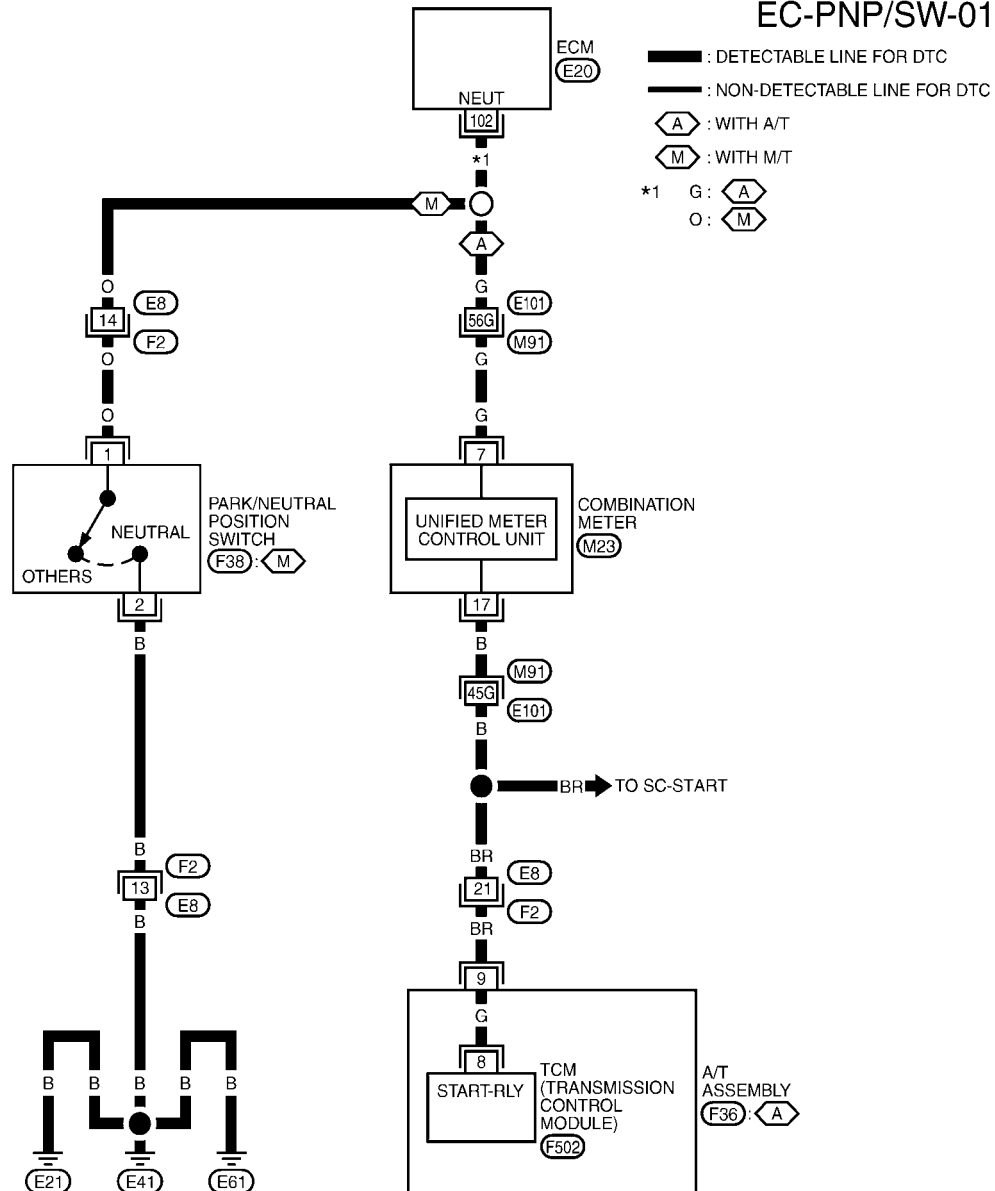
DTC P1706 PNP SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

INFOID:0000000005448528

Wiring Diagram



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1706 PNP SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G (A/T) O (M/T)	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] • Except above position	BATTERY VOLTAGE (11 - 14V)

A

EC

Diagnosis Procedure

INFOID:000000005448529

C

A/T MODELS

1.CHECK DTC WITH TCM

D

Refer to [AT-48](#).

OK or NG

E

OK >> GO TO 2.

NG >> Repair or replace.

2.CHECK STARTING SYSTEM

F

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

Yes or No

G

Yes >> GO TO 3.

No >> Refer to [SC-35](#).

3.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

H

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 17.
Refer to Wiring Diagram.

I

Continuity should exist.

J

5. Also check harness for short to ground and short to power.

OK or NG

K

OK >> GO TO 5.

NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

L

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Harness for open or short between A/T assembly and combination meter.

M

>> Repair open circuit or short to ground or short to power in harness or connectors.

N

5.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

O

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 7.
Refer to Wiring Diagram.

Continuity should exist.

P

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

DTC P1706 PNP SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

Check the following.

- Harness connectors E101, M91
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8.

Refer to [AT-112](#).

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

OK >> GO TO 9.

NG >> Repair or replace.

9. REPLACE COMBINATION METER

Refer to [DI-4](#).

>> **INSPECTION END**

M/T MODELS

1. CHECK PNP SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3

NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F2, E8
- Harness for open or short between PNP switch and ground

>> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

DTC P1706 PNP SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

OK >> GO TO 5.
NG >> GO TO 4.

A

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between PNP switch and ECM

EC

>> Repair open circuit or short to ground or short to power in harness or connectors.

C

5.CHECK PNP SWITCH

Refer to [MT-13, "Checking"](#).

D

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

E

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

F

>> **INSPECTION END**

G

H

I

J

K

L

M

N

O

P

DTC P1715 INPUT SPEED SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1715 INPUT SPEED SENSOR

Description

INFOID:000000005448530

ECM receives input speed signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448531

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:000000005448532

NOTE:

- If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-149](#).
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-274](#).
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-242](#).
- If DTC P1715 is displayed with DTC P0340, P0345 first perform the trouble diagnosis for DTC P0340, P0345. Refer to [EC-248](#).

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed signal is different from the theoretical value calculated by ECM from output shaft revolution signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:000000005448533

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-48](#).

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to [AT-48](#).

>> INSPECTION END

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P1805 BRAKE SWITCH

Description

INFOID:000000005448534

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448535

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000005448536

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

INFOID:000000005448537

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-439, "Diagnosis Procedure"](#).

⑧ WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P1805 BRAKE SWITCH

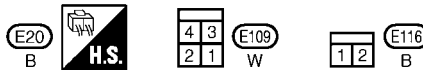
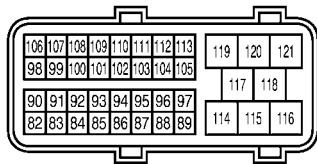
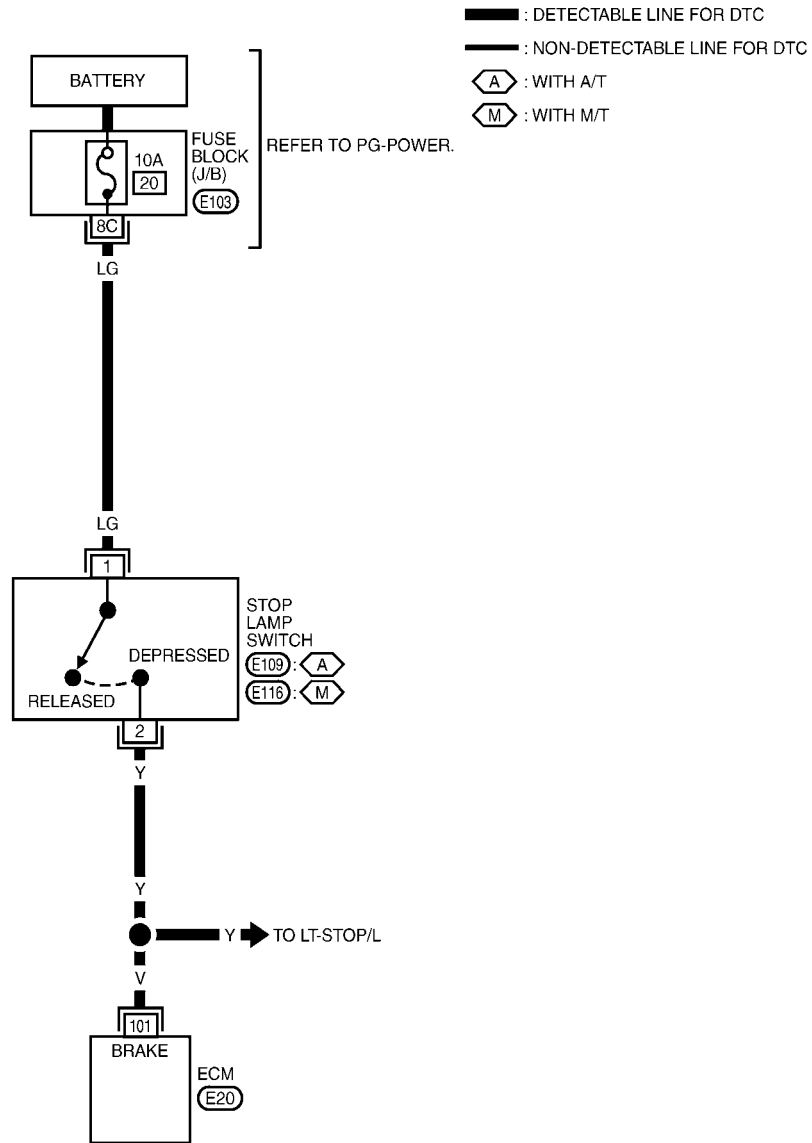
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448538

EC-BRK/SW-01



REFER TO THE FOLLOWING.

E103 - FUSE BLOCK - JUNCTION BOX (J/B)

JMBWA0495GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448539

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

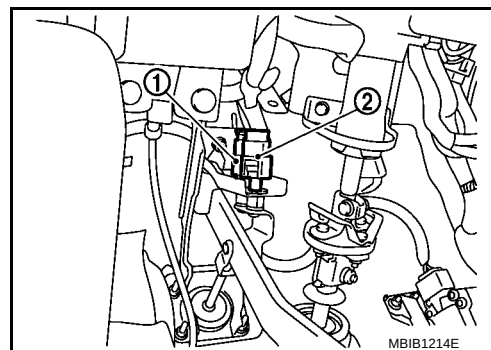
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

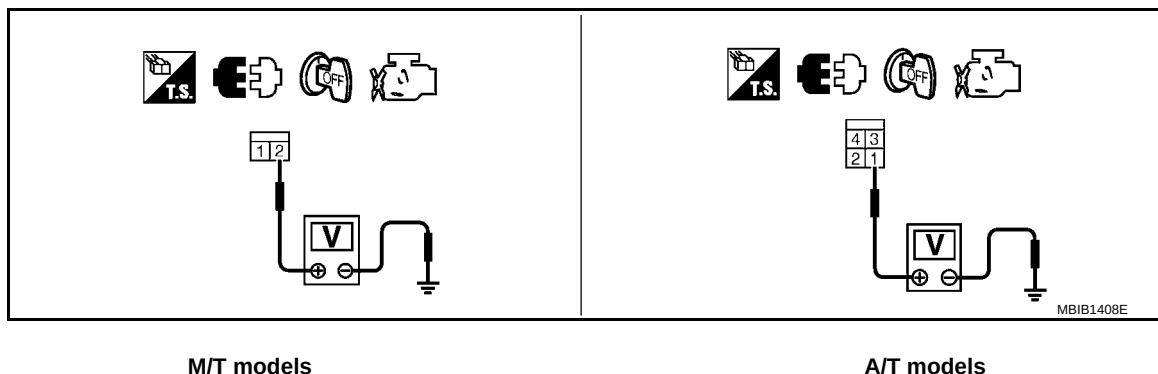
- OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (2) harness connector.
- ASCD brake switch (1)



2. Check voltage between stop lamp switch terminal 1 (A/T) or 2 (M/T) and ground with CONSULT or tester.



M/T models

A/T models

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E103
- Harness for open and short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2 (A/T) or 1 (M/T).
Refer to Wiring Diagram.

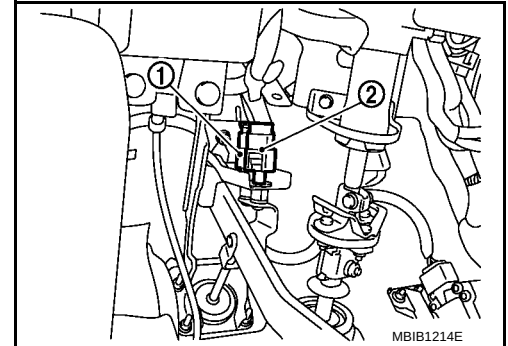
Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



5. CHECK STOP LAMP SWITCH

Refer to [EC-440. "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

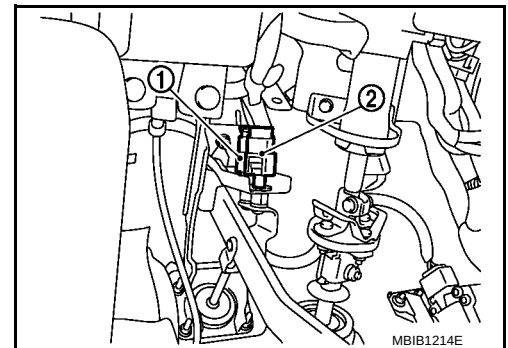
>> **INSPECTION END**

Component Inspection

INFOID:000000005448540

STOP LAMP SWITCH

1. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

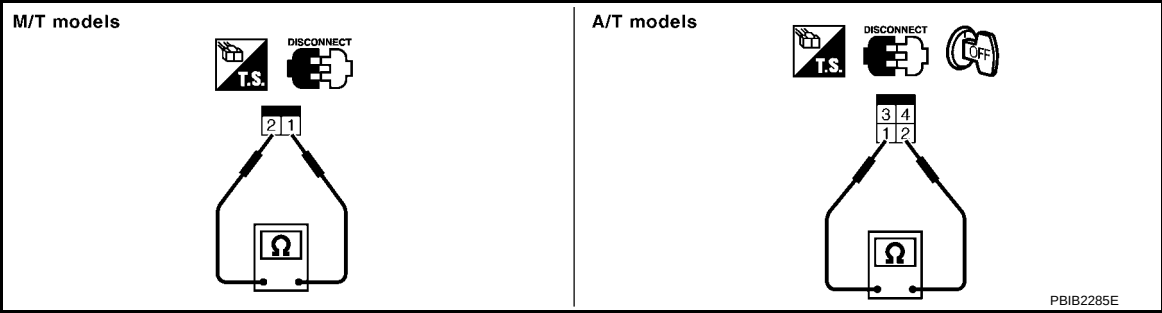


DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

3. If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 2 again.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P2122, P2123 APP SENSOR

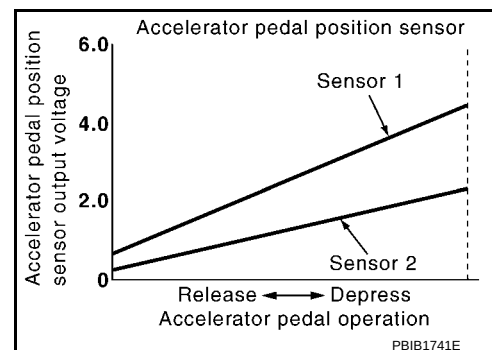
Component Description

INFOID:000000005448541

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448542

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448543

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-344](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (The APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448544

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-445, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

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DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

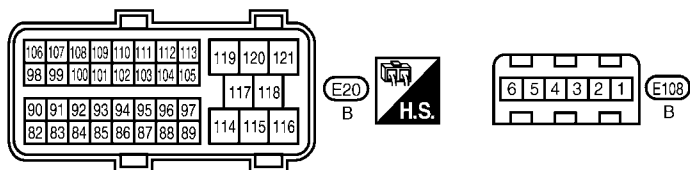
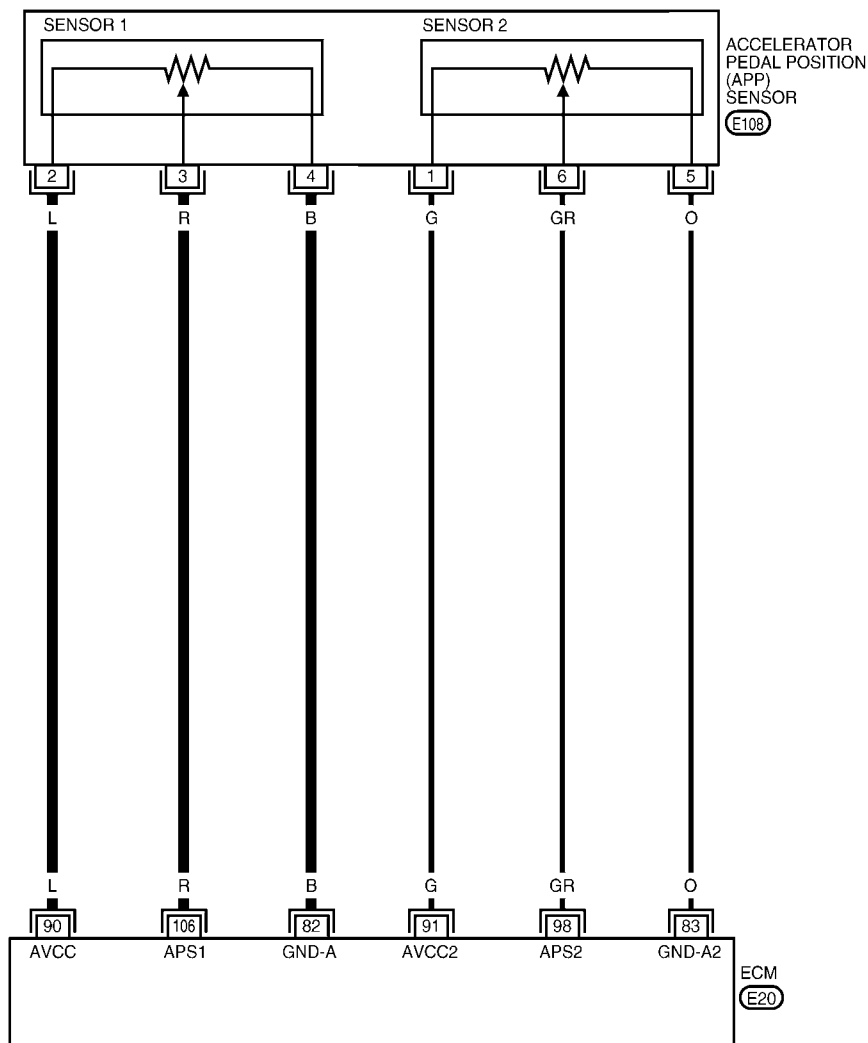
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448545

EC-APPS1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1313E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

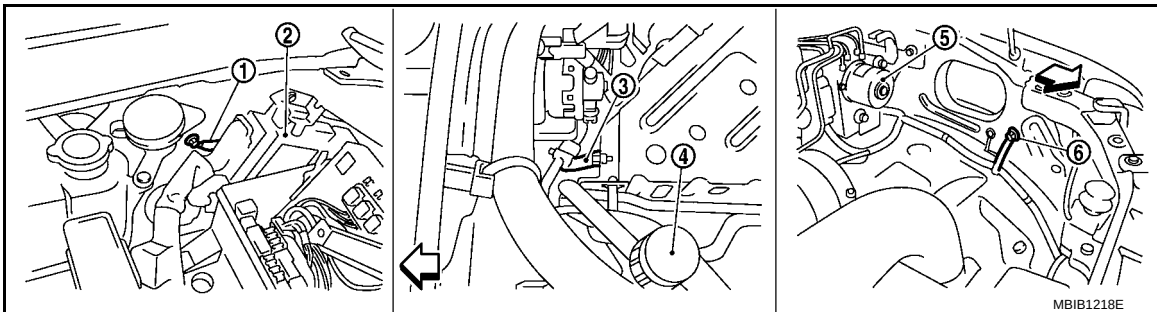
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448546

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-147. "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

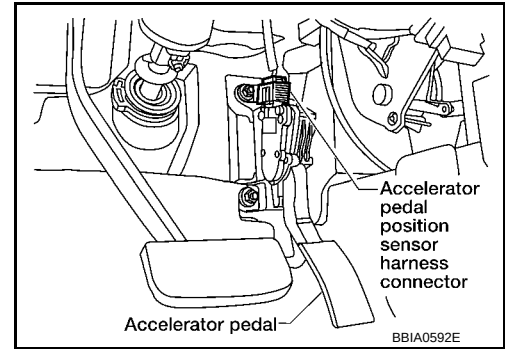
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

DTC P2122, P2123 APP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

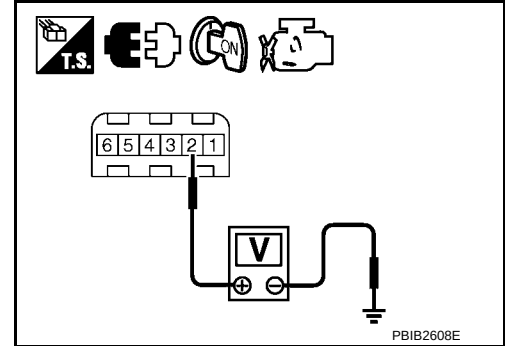


3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-447, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-82, "Idle Air Volume Learning"](#).

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

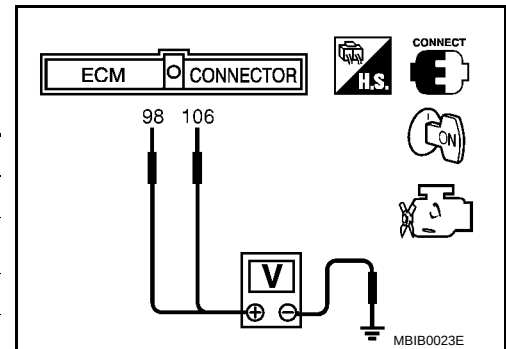
Component Inspection

INFOID:000000005448547

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-82, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005448548

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P2127, P2128 APP SENSOR

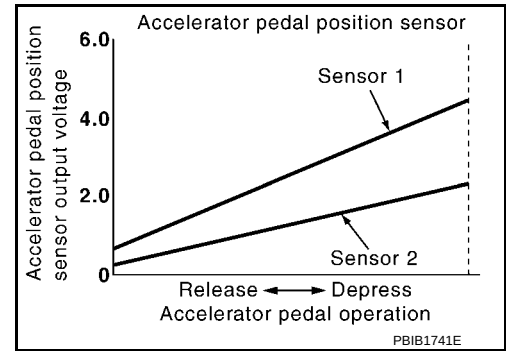
Component Description

INFOID:000000005448549

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448550

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448551

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit shorted.) • Accelerator pedal position sensor (APP sensor 2) • Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448552

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-451, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

A

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DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

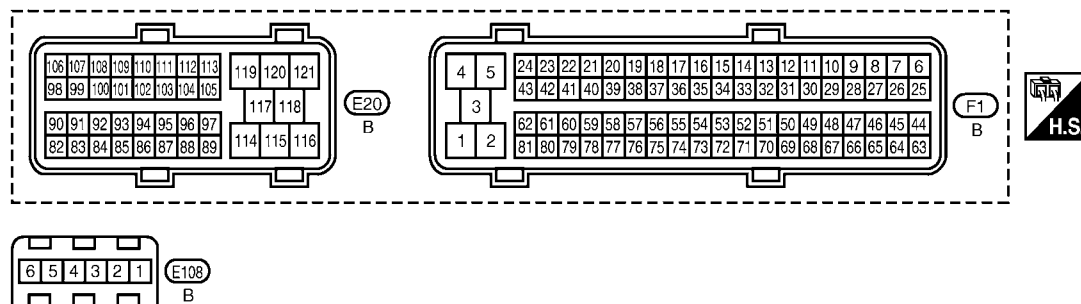
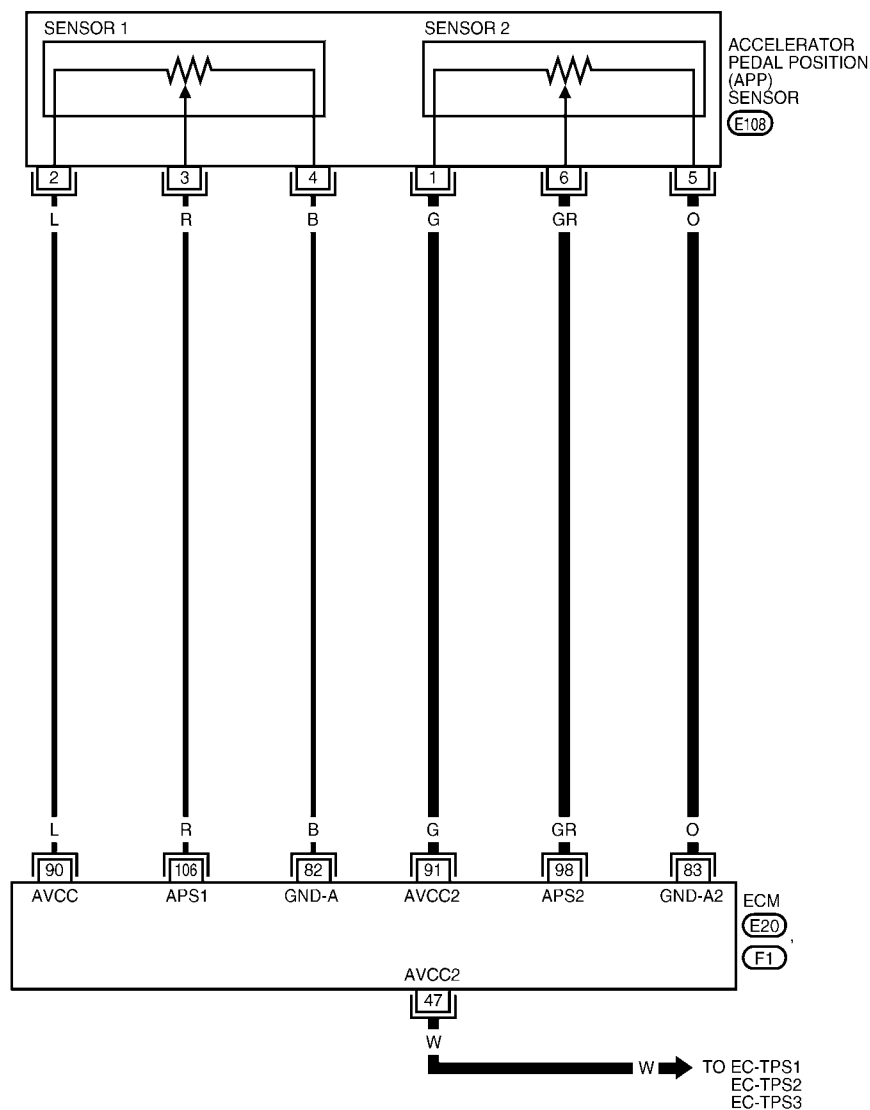
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448553

EC-APPS2-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1314E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

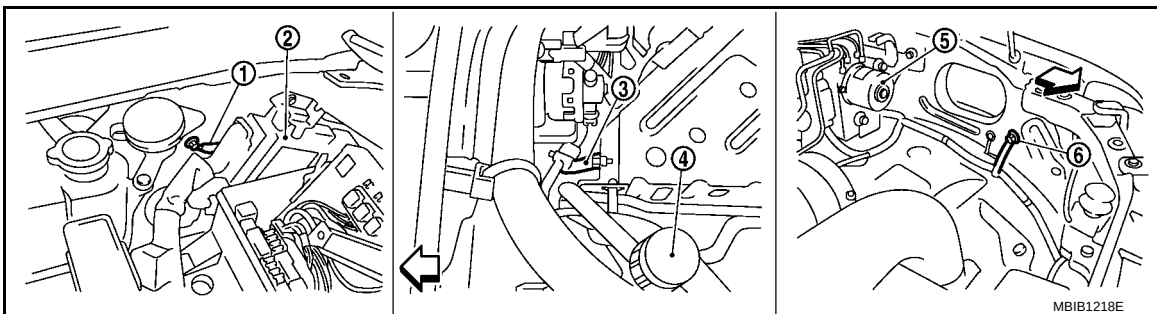
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448554

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body, Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

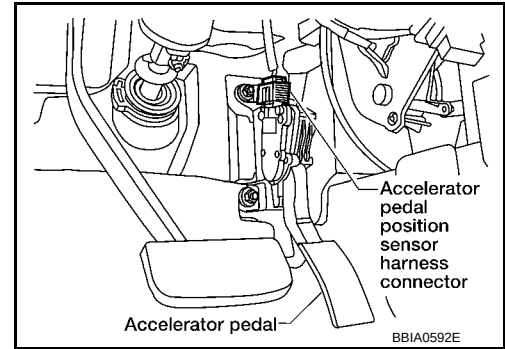
2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

DTC P2127, P2128 APP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

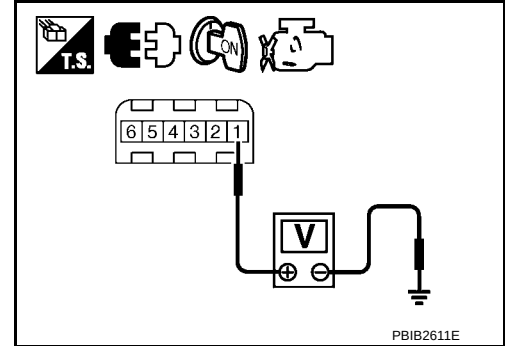


3. Check voltage between APP sensor terminal 1 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-450
47	Electric throttle control actuator terminal 2	EC-225

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-228, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

>> INSPECTION END

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to [EC-453, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-82, "Idle Air Volume Learning"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448555

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

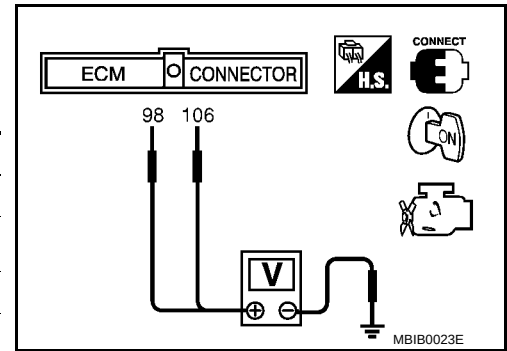
DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-82, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005448556

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

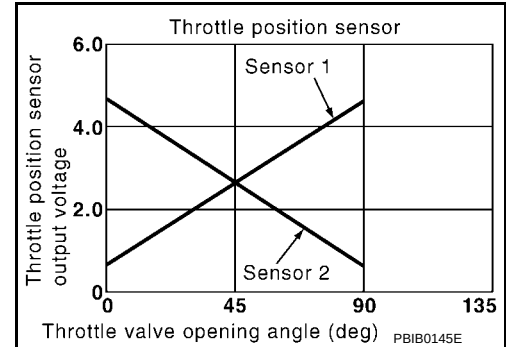
DTC P2135 TP SENSOR

Component Description

INFOID:000000005448557

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448558

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448559

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted). • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448560

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P2135 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

- Check DTC.
- If DTC is detected, go to [EC-457, "Diagnosis Procedure"](#).

 WITH GST

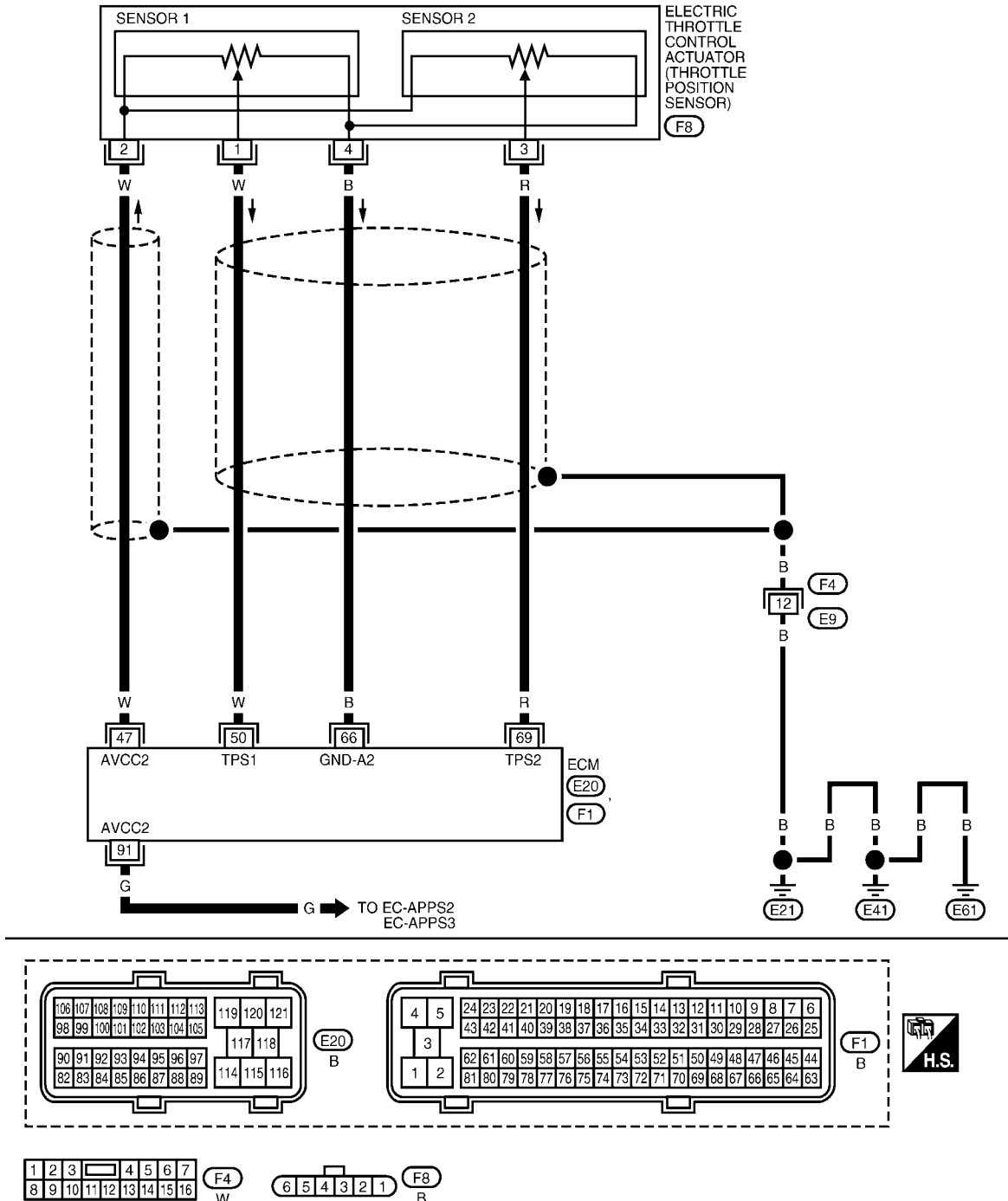
Follow the procedure "WITH CONSULT" above.

Wiring Diagram

INFOID:000000005448561

EC-TPS3-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

MBWA1315E

DTC P2135 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

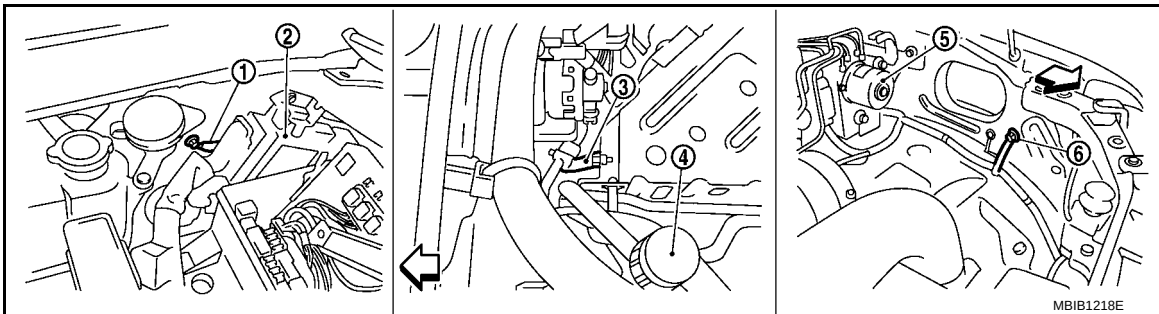
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448562

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

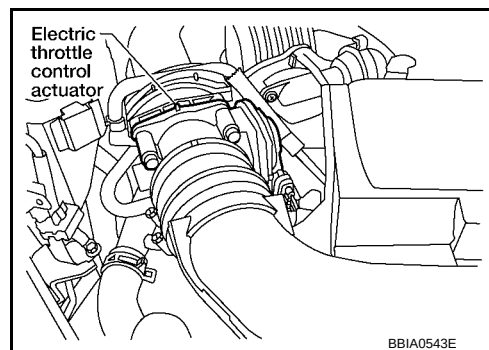
DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

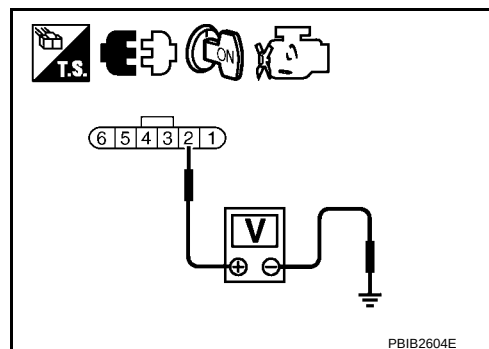


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-456
91	APP sensor terminal 1	EC-450

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-453, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

4. Perform [EC-82, "Idle Air Volume Learning"](#).

A

>> INSPECTION END

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

EC

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

C

Continuity should exist.

4. Also check harness for short to ground and short to power.

D

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

E

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

F

Continuity should exist.

2. Also check harness for short to ground and short to power.

G

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

H

9. CHECK THROTTLE POSITION SENSOR

Refer to [EC-459, "Component Inspection"](#).

I

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

J

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

K

1. Replace the electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

L

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

M

Refer to [EC-140](#).

N

>> INSPECTION END

Component Inspection

INFOID:000000005448563

O

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

P

DTC P2135 TP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

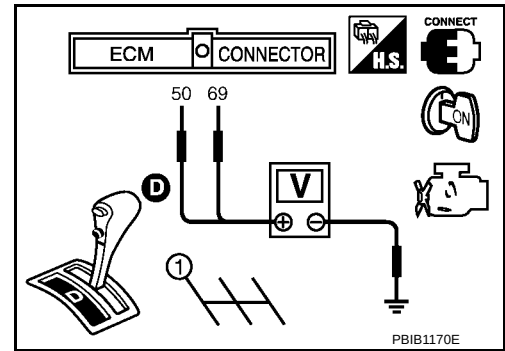
7. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-82, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



INFOID:0000000005448564

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

DTC P2138 APP SENSOR

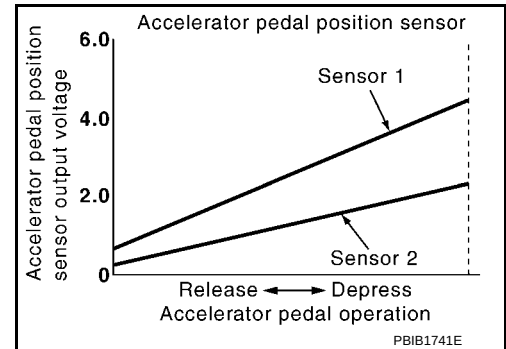
Component Description

INFOID:000000005448565

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448566

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448567

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-344](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (The TP sensor circuit is shorted.) • Accelerator pedal position sensor 1 and 2 • Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448568

NOTE:

DTC P2138 APP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-464, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT" above.

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

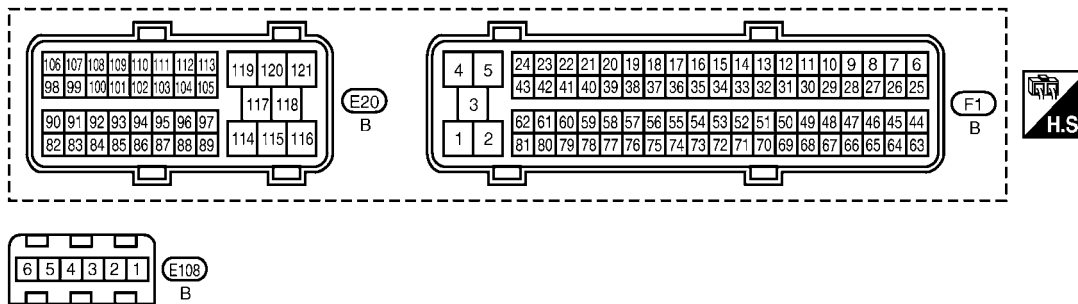
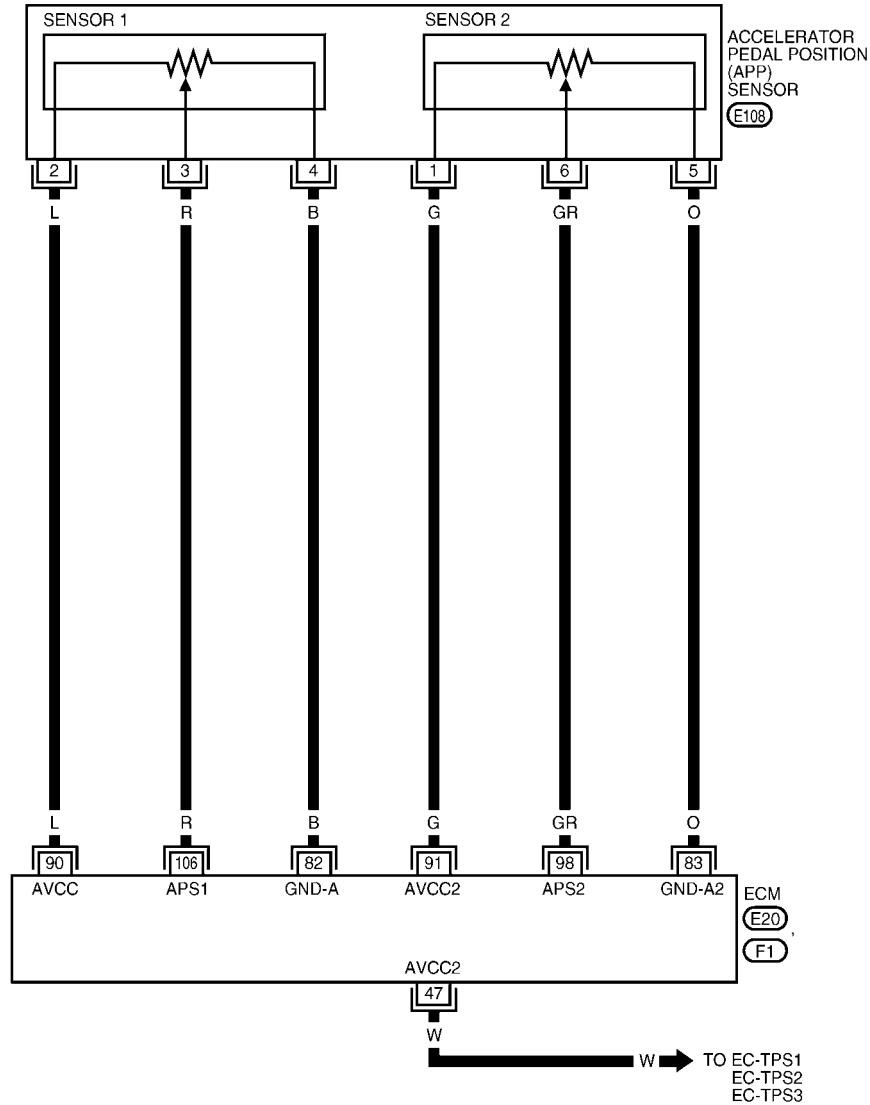
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448569

EC-APPS3-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1316E

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

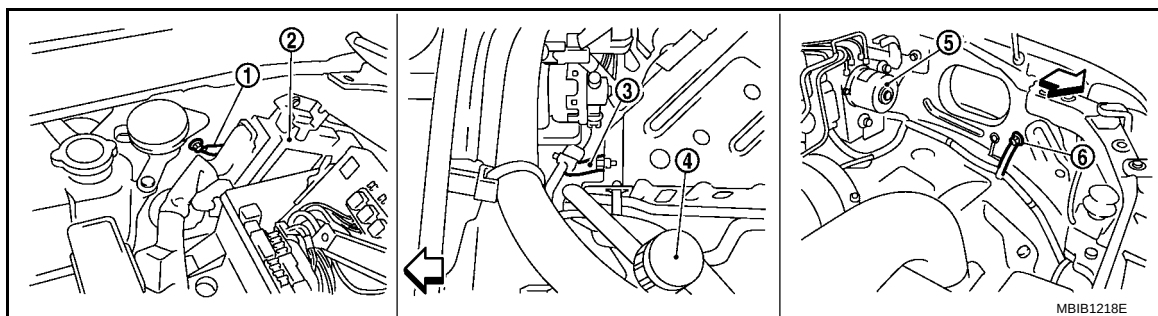
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448570

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

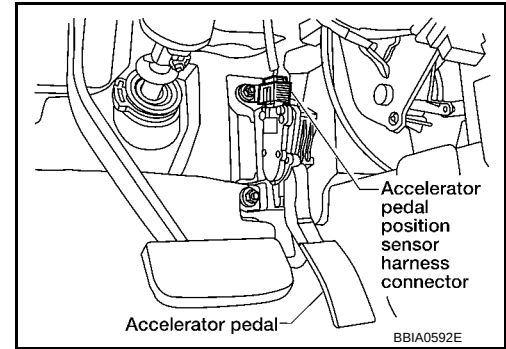
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

DTC P2138 APP SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

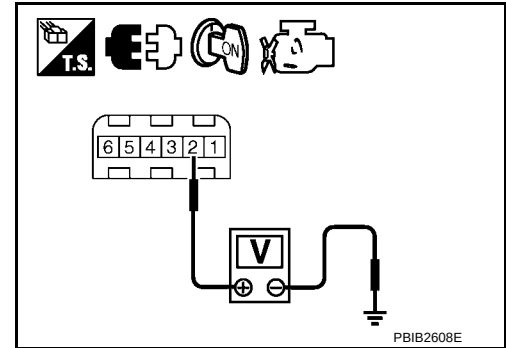


3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

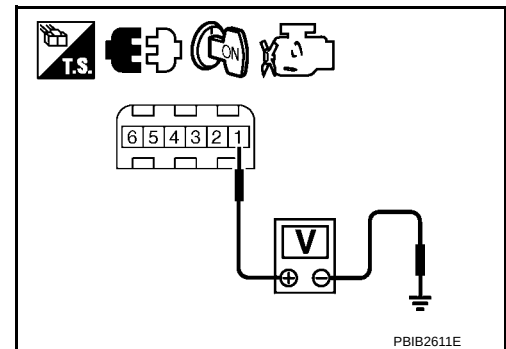
Check voltage between APP sensor terminal 1 and ground with CONSULT or tester.

- 1.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-463
47	Electric throttle control actuator terminal 2	EC-456

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

< SERVICE INFORMATION >

6.CHECK THROTTLE POSITION SENSOR

Refer to [EC-228, "Component Inspection"](#).OK or NG

- OK >> GO TO 12.
NG >> GO TO 7.

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

8.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK APP SENSOR

Refer to [EC-467, "Component Inspection"](#).OK or NG

- OK >> GO TO 12.
NG >> GO TO 11.

11.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-81, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-82, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-82, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).>> **INSPECTION END**

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

Component Inspection

INFOID:000000005448571

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V

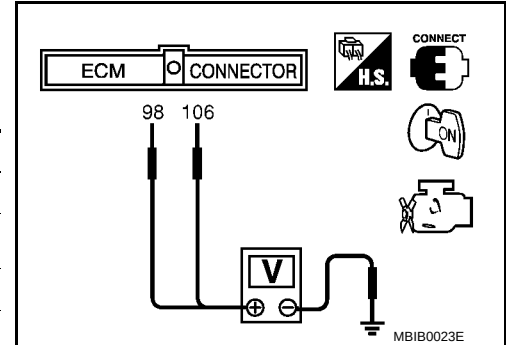
4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-81. "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-82. "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-82. "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005448572

ACCELERATOR PEDAL

Refer to [ACC-3](#).



ASCD BRAKE SWITCH

< SERVICE INFORMATION >

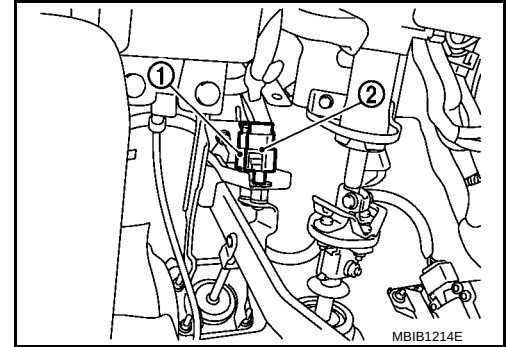
[VQ TYPE 1]

ASCD BRAKE SWITCH

Component Description

INFOID:000000005448573

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-42](#) for the ASCD function.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448574

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

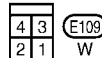
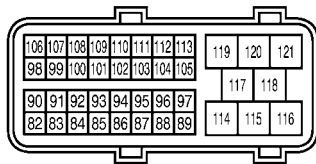
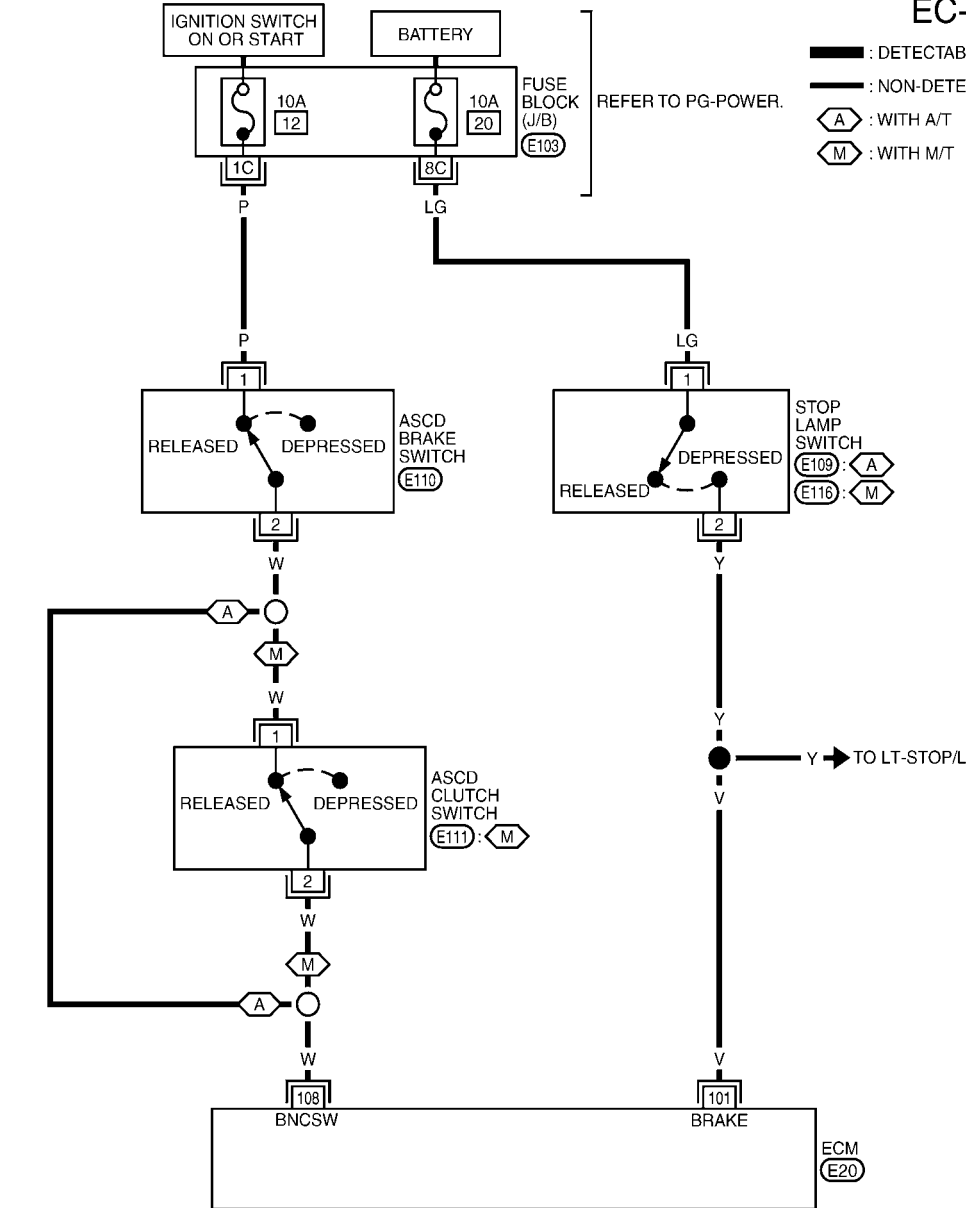
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448575

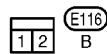
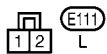
EC-ASCB0F-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC
 (A) : WITH A/T
 (M) : WITH M/T



REFER TO THE FOLLOWING.

(E103) - FUSE BLOCK - JUNCTION BOX (J/B)



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0496GB

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448576

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

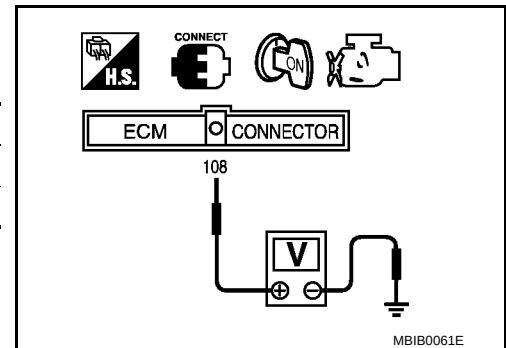
2.CHECK OVERALL FUNCTION-II

With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT



ASCD BRAKE SWITCH

[VQ TYPE 1]

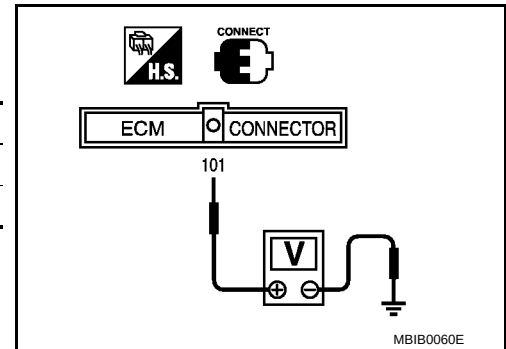
< SERVICE INFORMATION >

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

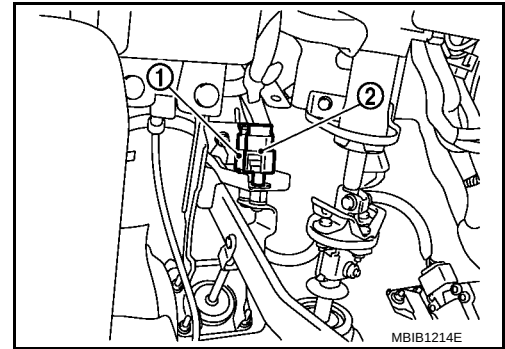
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 7.



3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
 - Stop lamp switch (2)
3. Turn ignition switch ON.

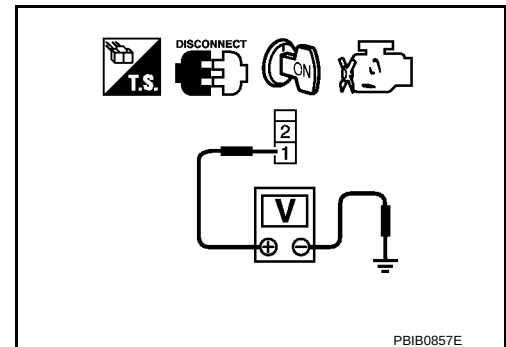


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

6. CHECK ASCD BRAKE SWITCH

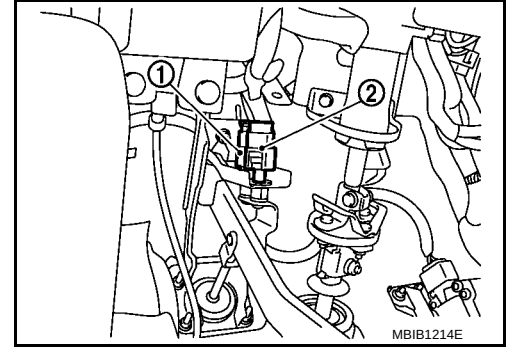
Refer to [EC-476. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

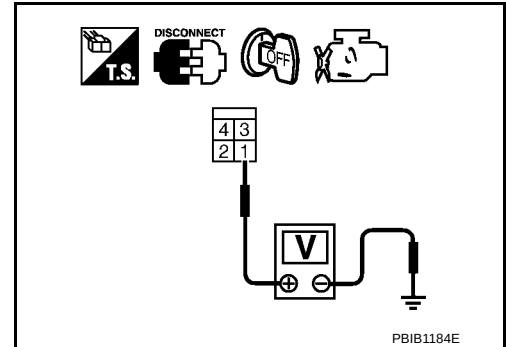


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to [EC-476. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace stop lamp switch.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 1]

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

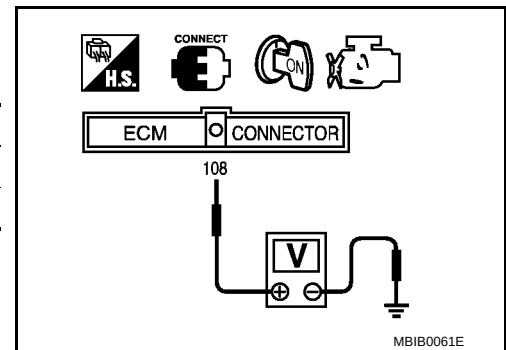
1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT

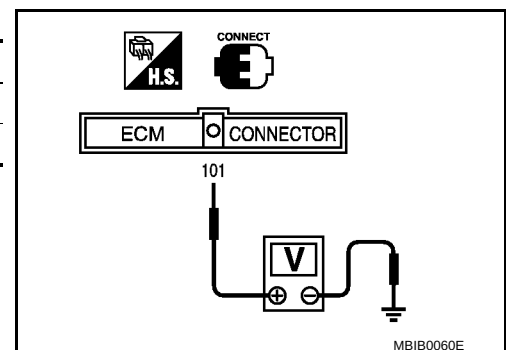
Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



ASCD BRAKE SWITCH

[VQ TYPE 1]

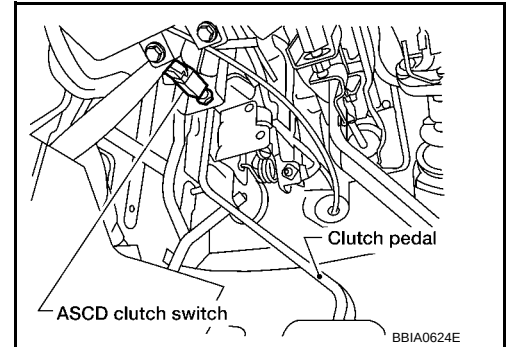
< SERVICE INFORMATION >

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 10.

3.CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

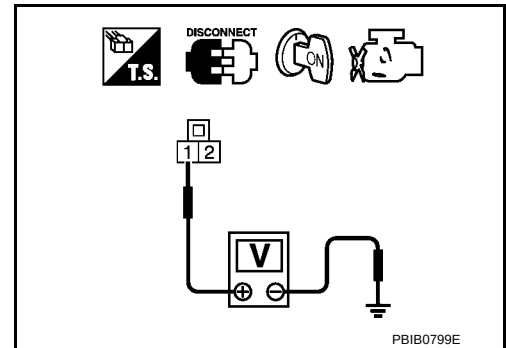


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

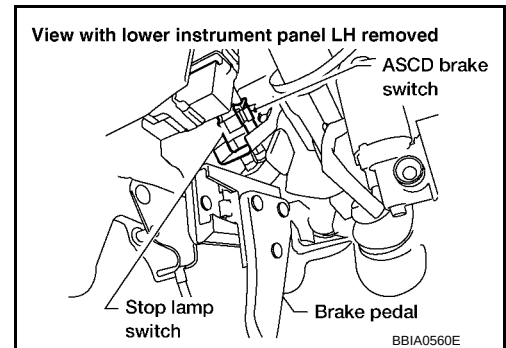
OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

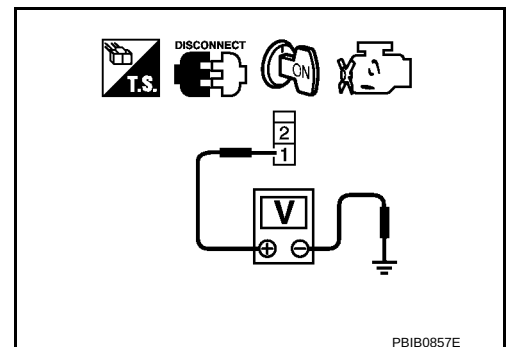


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103

ASCD BRAKE SWITCH

[VQ TYPE 1]

< SERVICE INFORMATION >

- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH

Refer to [EC-476, "Component Inspection"](#).

OK or NG

OK >> GO TO 14.

NG >> Replace ASCD brake switch.

8.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD CLUTCH SWITCH

Refer to [EC-476, "Component Inspection"](#).

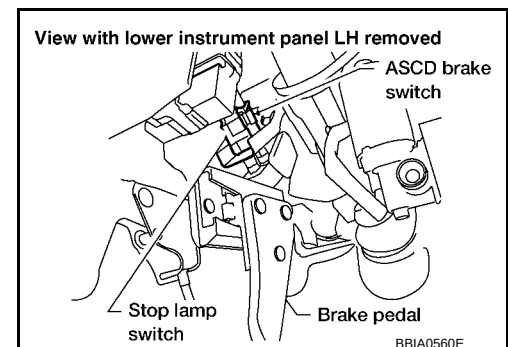
OK or NG

OK >> GO TO 14.

NG >> Replace ASCD clutch switch.

10.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



ASCD BRAKE SWITCH

[VQ TYPE 1]

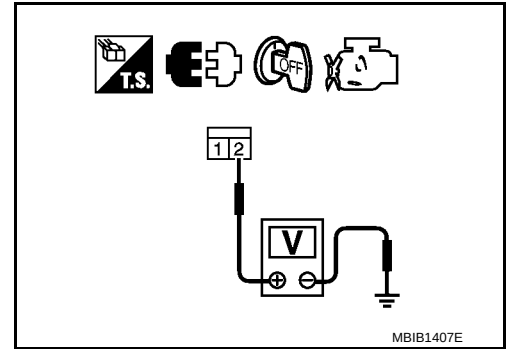
< SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 12.
NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to [EC-476, "Component Inspection"](#).

OK or NG

- OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448577

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

ASCD INDICATOR

Component Description

INFOID:000000005448578

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.

Refer to [EC-42](#) for the ASCD function.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448579

Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

ASC D INDICATOR

< SERVICE INFORMATION >

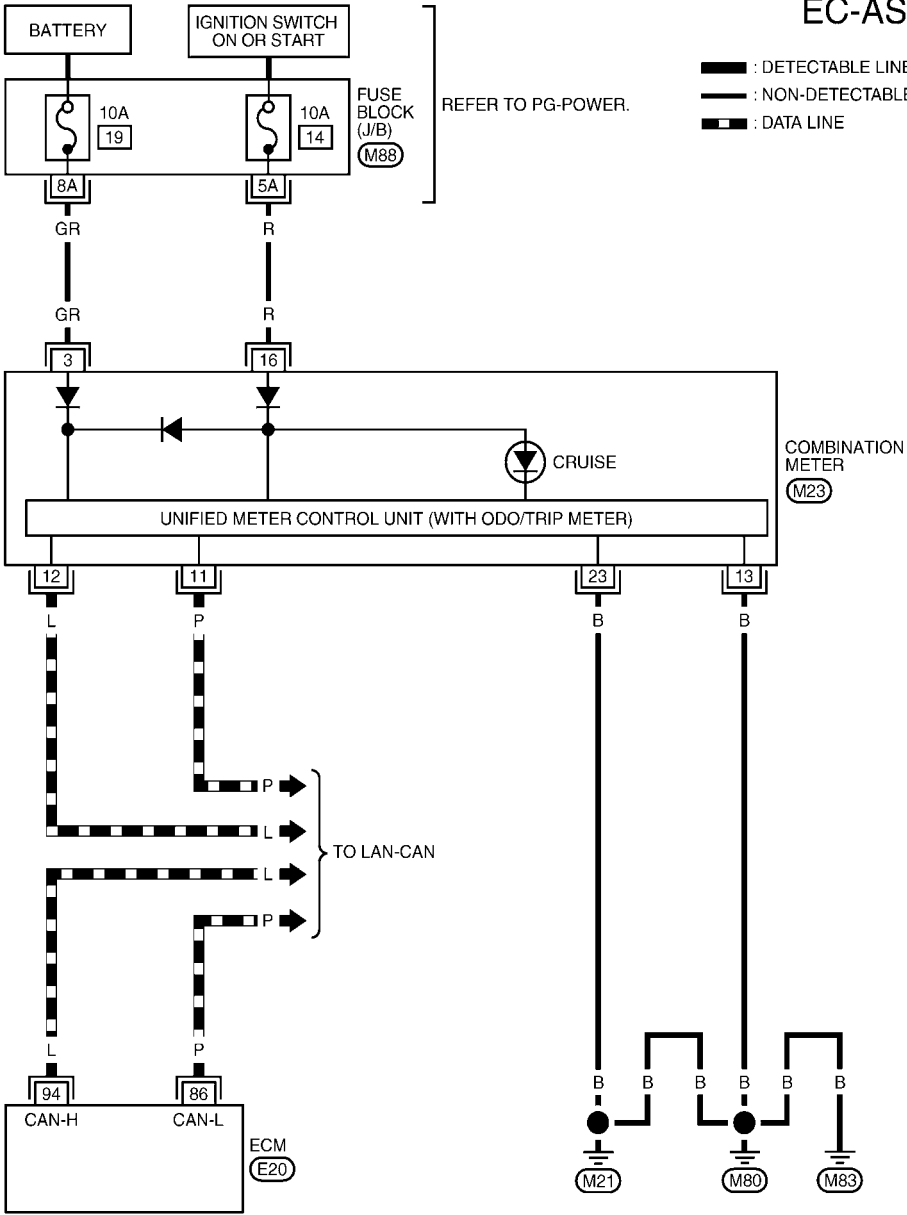
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448580

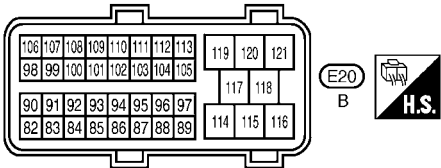
EC-ASCIND-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC
- - : DATA LINE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

(M23) W



REFER TO THE FOLLOWING.
(M88) - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1967E

Diagnosis Procedure

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

INFOID:000000005448581

ASCD INDICATOR

< SERVICE INFORMATION >

[VQ TYPE 1]

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

2.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.

NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to [EC-149](#).

3.CHECK COMBINATION METER FUNCTION

Refer to [DI-4](#).

OK or NG

OK >> GO TO 4.

NG >> Go to [DI-8, "Arrangement of Combination Meter"](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 1]

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000005448582

The electrical load signal (Headlamp switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448583

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch and lighting switch are OFF.	OFF
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF

Diagnosis Procedure

INFOID:000000005448584

1.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

- Turn ignition switch ON.
- Connect CONSULT and select "DATA MONITOR" mode.
- Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

OK or NG

- OK >> GO TO 2.
NG >> GO TO 4.

2.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

- OK >> GO TO 3.
NG >> GO TO 5.

3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 6.

4.CHECK REAR WINDOW DEFOGGER SYSTEM

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 1]

Refer to [GW-50](#).

>> INSPECTION END

5.CHECK HEADLAMP SYSTEM

Refer to [LT-4](#).

>> INSPECTION END

6.CHECK HEATER FAN CONTROL SYSTEM

Refer to [ATC-155](#).

>> INSPECTION END

EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

EVAP CANISTER VENT CONTROL VALVE

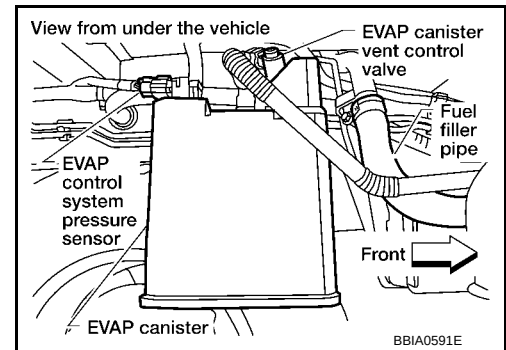
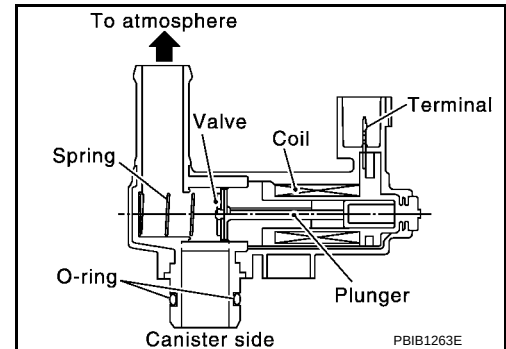
Component Description

INFOID:000000005448585

The EVAP canister vent control valve is located on the EVAP canister.

This solenoid valve is not used for engine control, and always remains open.

If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressured and EVAP canister may be damaged.



EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

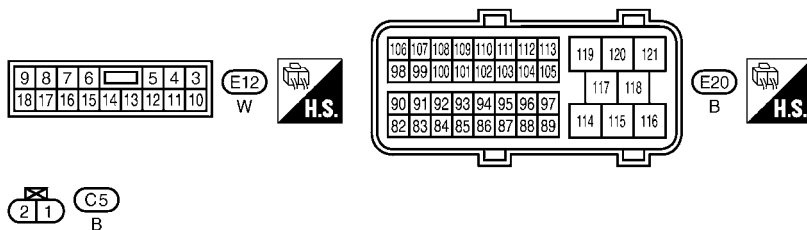
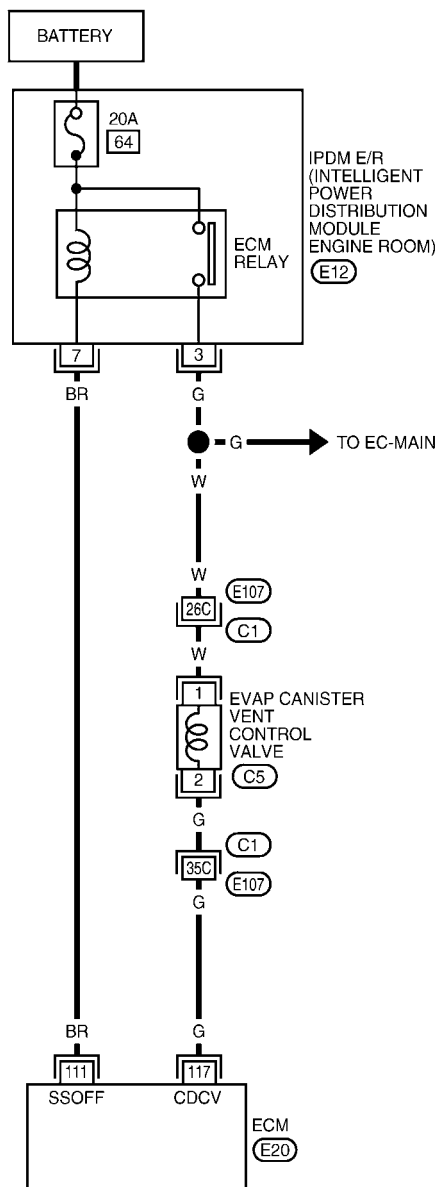
Wiring Diagram

INFOID:000000005448586

EC-VENT-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC

REFER TO PG-POWER.



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0445GB

EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 1]

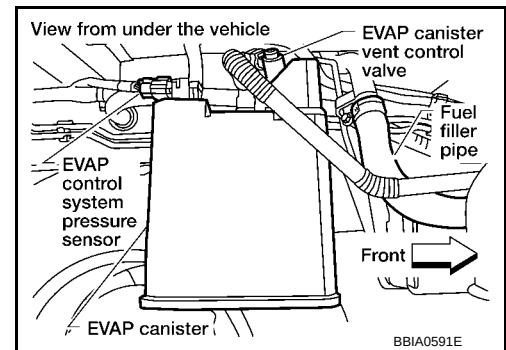
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	G	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448587

1.CHECK OVERALL FUNCTION

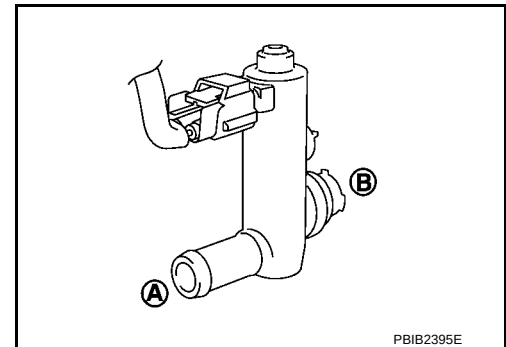
- Turn ignition switch OFF.
- Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
- Start engine.



- Blow air into port **A** and check that it flows freely out of port **B**.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



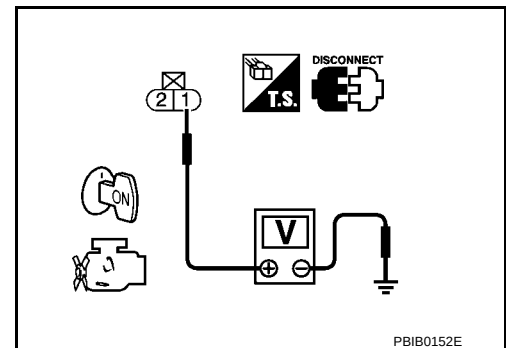
2.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- Disconnect EVAP canister vent control valve harness connector.
- Turn ignition switch ON.
- Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

EVAP CANISTER VENT CONTROL VALVE

[VQ TYPE 1]

< SERVICE INFORMATION >

Check the following.

- Harness connectors E107, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-486, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> Replace EVAP canister vent control valve.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

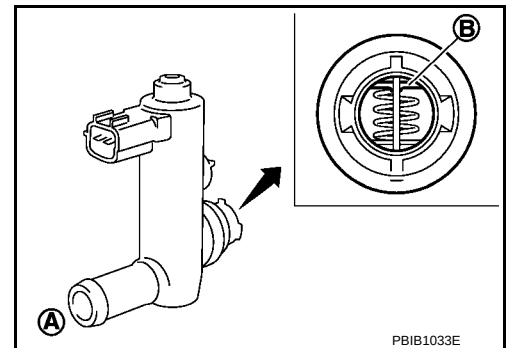
>> **INSPECTION END**

Component Inspection

INFOID:000000005448588

EVAP CANISTER VENT CONTROL VALVE

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



EVAP CANISTER VENT CONTROL VALVE

[VQ TYPE 1]

< SERVICE INFORMATION >

3. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

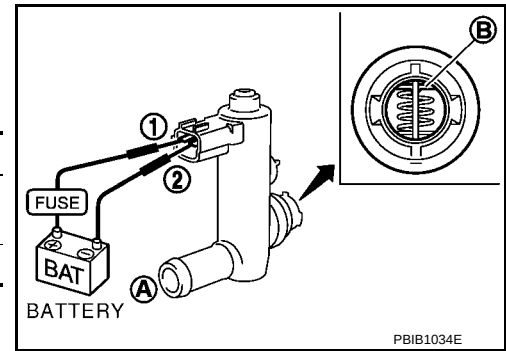
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.

If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

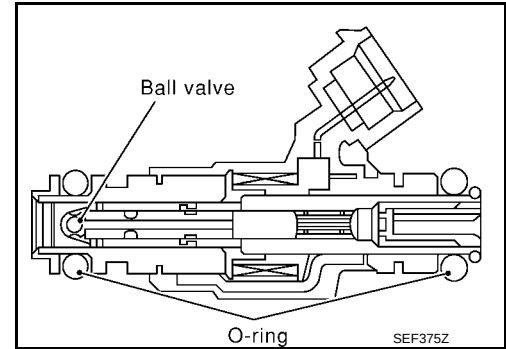


FUEL INJECTOR

Component Description

INFOID:000000005448589

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448590

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-132 .		
INJ PULSE-B1 INJ PULSE-B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

FUEL INJECTOR

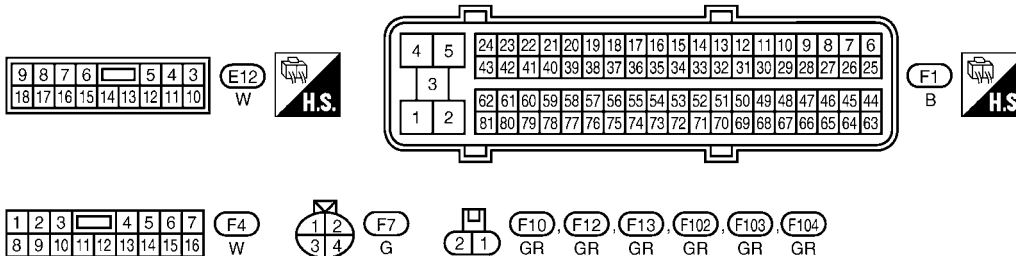
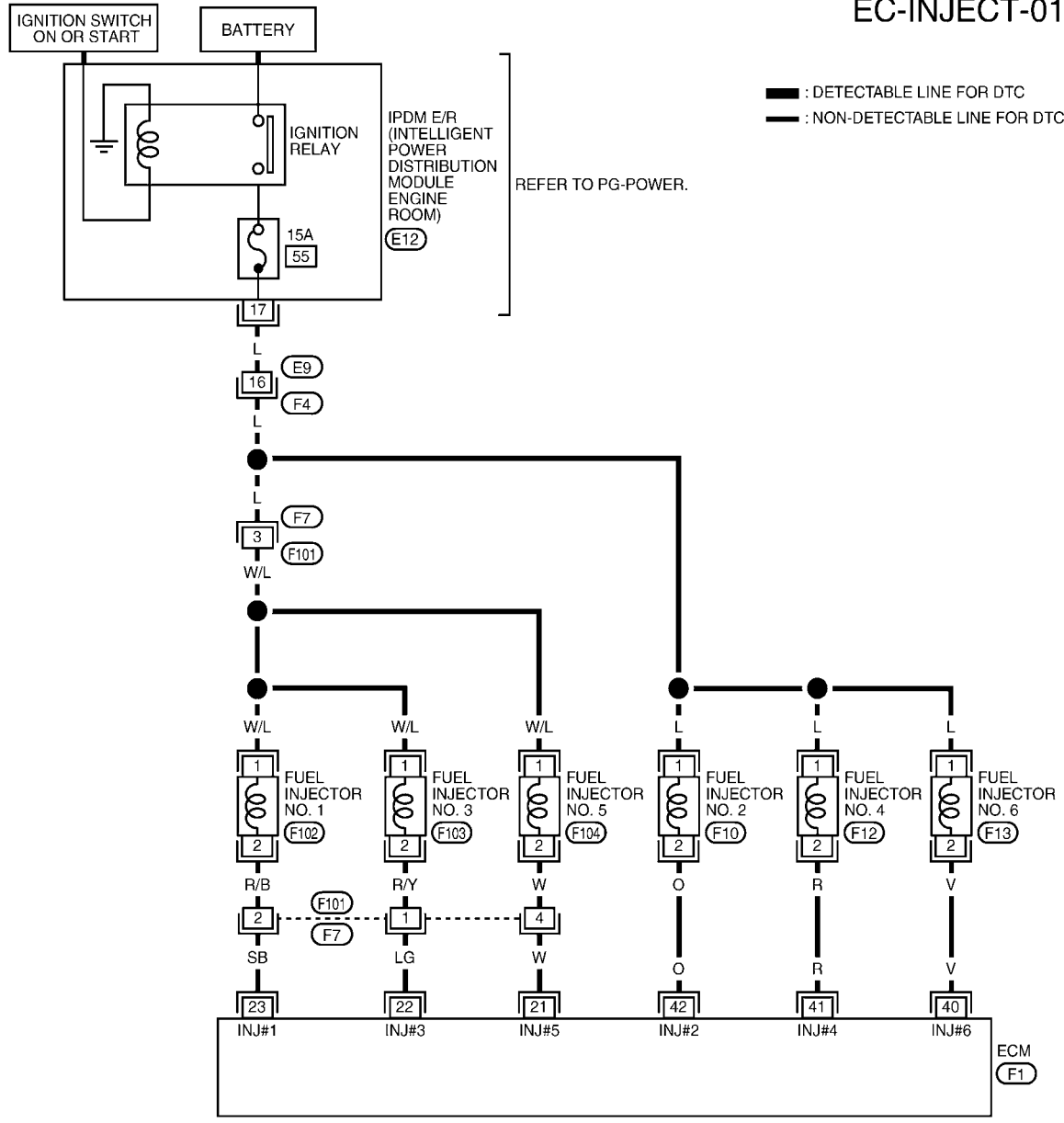
< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448591

EC-INJECT-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

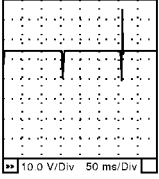
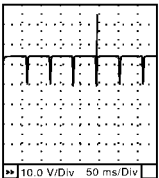
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

FUEL INJECTOR

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	W	Fuel injector No. 5	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
22	LG	Fuel injector No. 3		
23	SB	Fuel injector No. 1		
40	V	Fuel injector No. 6	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
41	R	Fuel injector No. 4		
42	O	Fuel injector No. 2		

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448592

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

Yes or No

Yes (With CONSULT)>>GO TO 2.

Yes (Without CONSULT)>>GO TO 3.

No >> GO TO 7.

2.CHECK OVERALL FUNCTION

⑧ With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

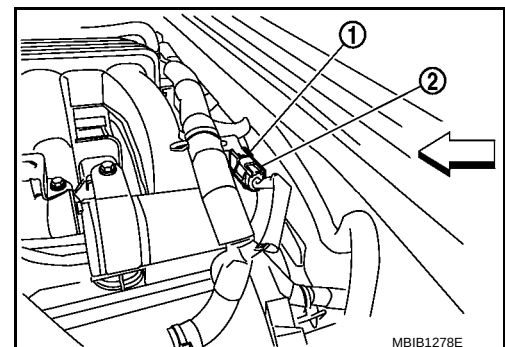
OK >> **INSPECTION END**

NG >> GO TO 7.

3.CHECK FUNCTION OF FUEL INJECTOR-I

⊗ Without CONSULT

1. Stop engine.
 2. Disconnect harness connector F101 (1), F7 (2).
- ⇐: Vehicle front
3. Turn ignition switch ON.



FUEL INJECTOR

[VQ TYPE 1]

< SERVICE INFORMATION >

- Check voltage between harness connector F7 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between harness connector F7 and ECM as follows.
Refer to Wiring Diagram.

Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between harness connector F7 and fuse
- Harness for open or short between harness connector F7 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(-)
1	3	2
3	3	1
5	3	4

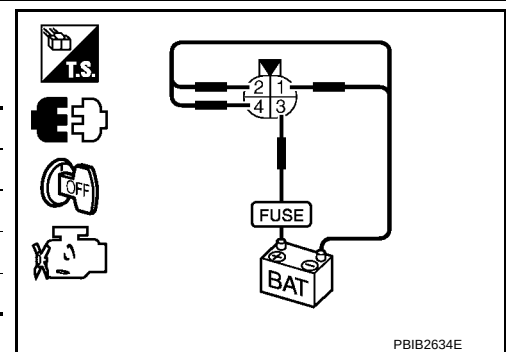
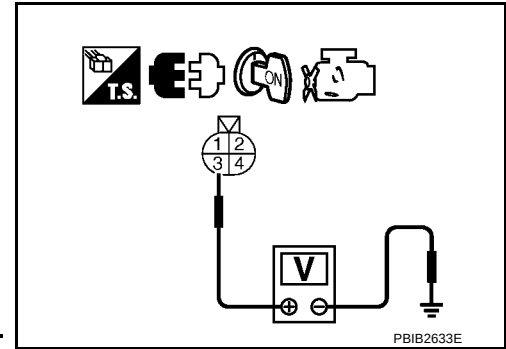
Operating sound should exist.

OK or NG

- OK >> GO TO 6.
NG >> GO TO 7.

6.CHECK FUNCTION OF FUEL INJECTOR-III

- Reconnect all harness connector disconnected.
- Start engine.



FUEL INJECTOR

[VQ TYPE 1]

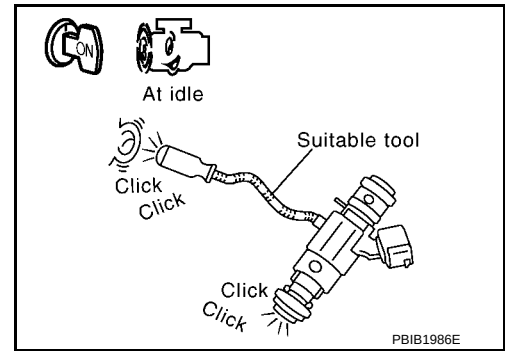
< SERVICE INFORMATION >

- Listen to fuel injectors No. 2, No. 4, No.6 operating sound.

Clicking noise should exist.

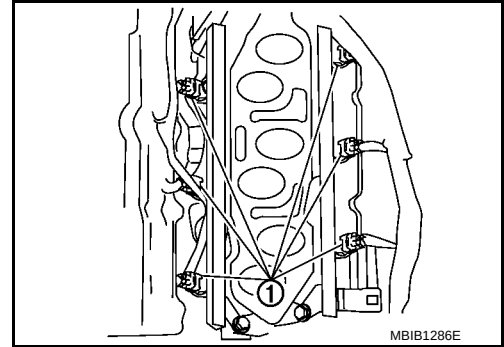
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 7.



7. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector (1).

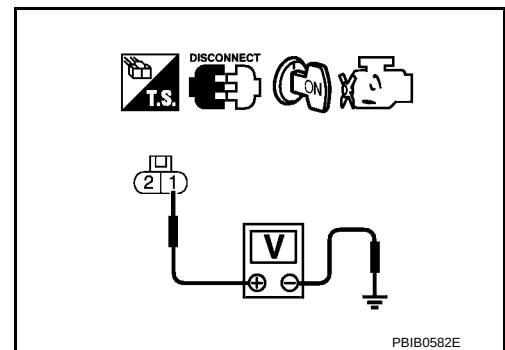


- Turn ignition switch ON.
- Check voltage between fuel injector terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F7, F101
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

9. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between fuel injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

FUEL INJECTOR

[VQ TYPE 1]

< SERVICE INFORMATION >

- OK >> GO TO 11.
- NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F101, F7 (bank 1)
- Harness for open or short between fuel injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK FUEL INJECTOR

Refer to [EC-493, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Replace fuel injector.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

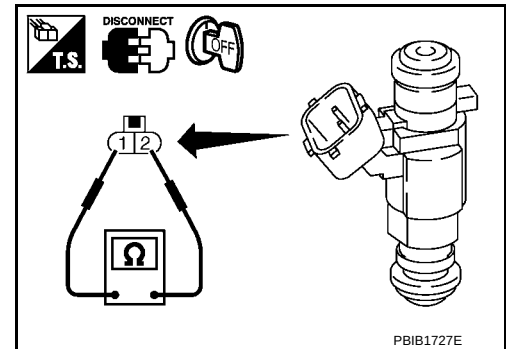
Component Inspection

INFOID:000000005448593

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



INFOID:000000005448594

Removal and Installation

FUEL INJECTOR

Refer to [EM-36](#).

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 1]

FUEL PUMP

Description

INFOID:000000005448595

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

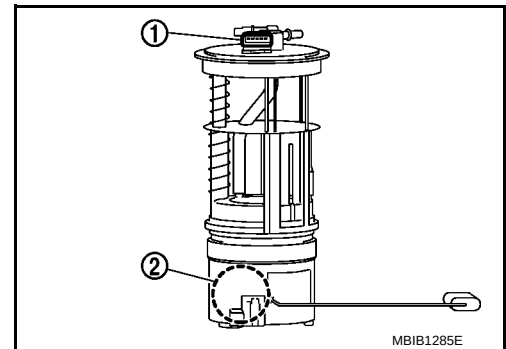
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump
- Fuel pressure regulator



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448596

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking	ON
	• Except above conditions	OFF

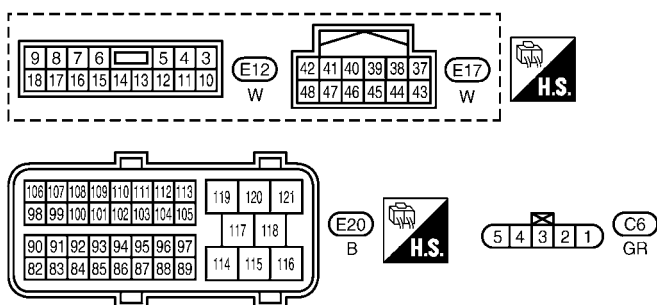
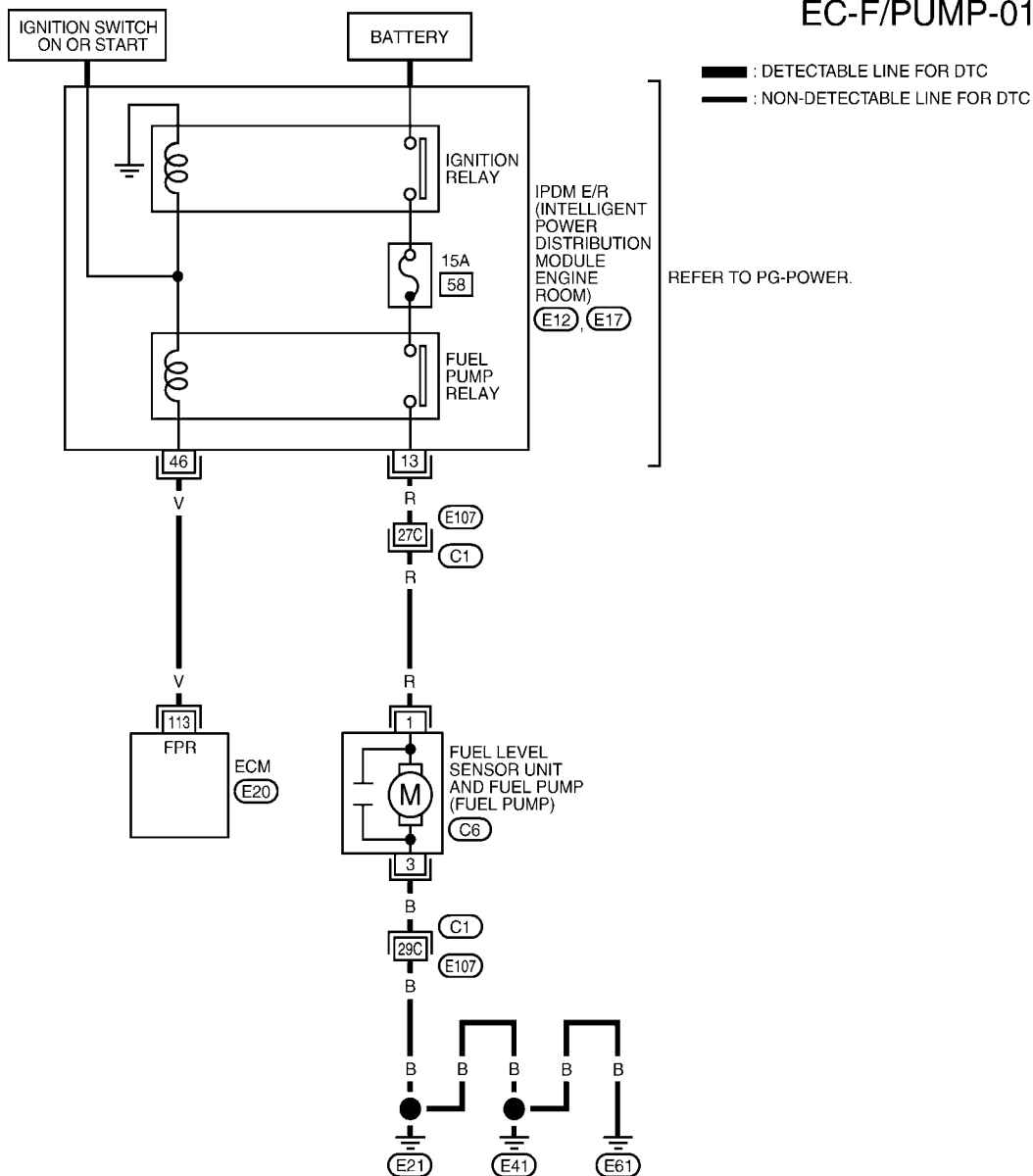
FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:0000000005448597



REFER TO THE FOLLOWING.
(C1) - SUPER MULTIPLE
 JUNCTION (SMJ)

JMBWA0447GB

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON	0 - 1.5V
			[Engine is running] [Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

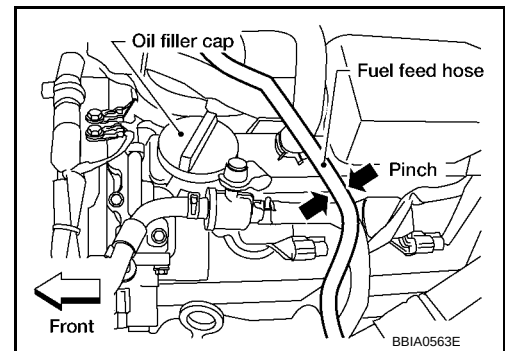
INFOID:000000005448598

1.CHECK OVERALL FUNCTION

- Turn ignition switch ON.
- Pinch fuel feed hose with two fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



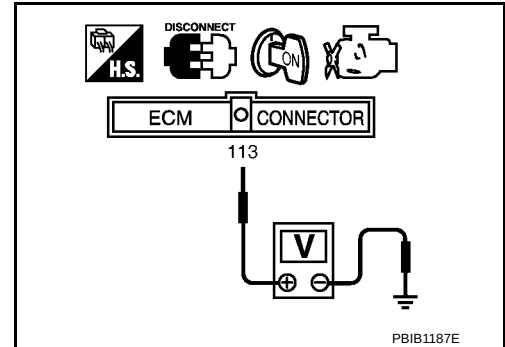
2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Turn ignition switch ON.
- Check voltage between ECM terminal 113 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



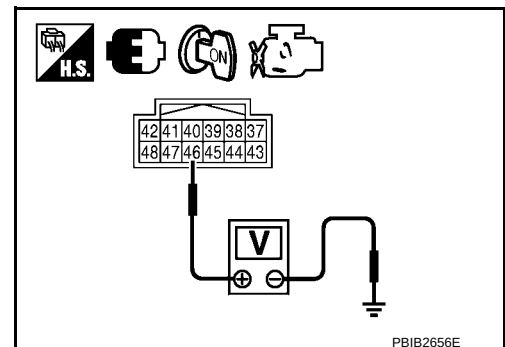
3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 12.



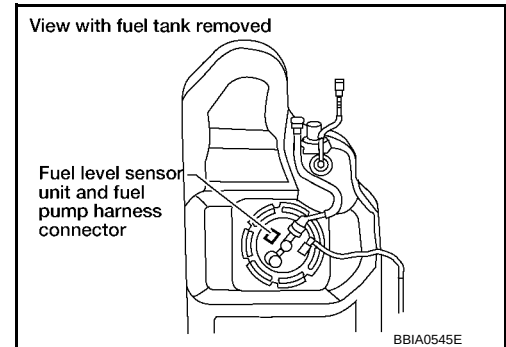
4.DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
4. Turn ignition switch ON.

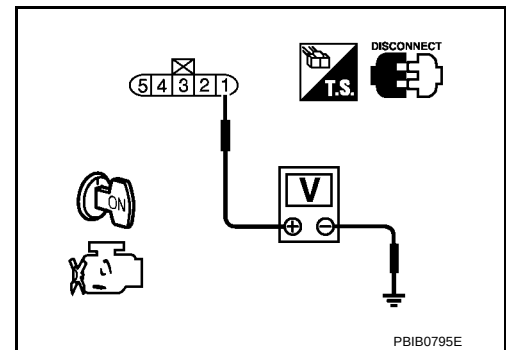


5. Check voltage between "fuel level sensor unit and fuel pump" terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

- OK >> GO TO 9.
NG >> GO TO 6.



6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

- OK >> GO TO 7.
NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CURCUIT-IV

1. Disconnect IPDM E/R harness connector E12.
2. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 1 and IPDM E/R terminal 13.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 12.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between "fuel level sensor unit and fuel pump" and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 1]

1. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 3 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground.

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between "fuel level sensor unit and fuel pump" and ground

>> Repair open circuit or short to power in harness or connectors.

11.CHECK FUEL PUMP

Refer to [EC-498, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Replace fuel pump.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> Replace IPDM E/R.
- NG >> Repair or replace harness or connectors.

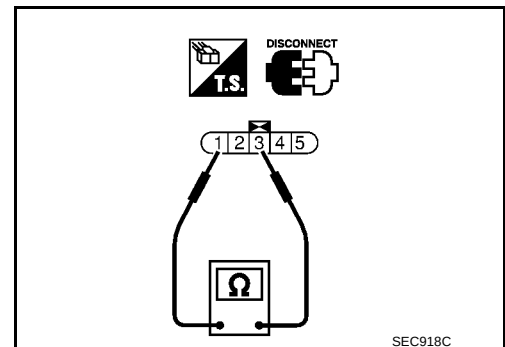
Component Inspection

INFOID:000000005448599

FUEL PUMP

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Check resistance between "fuel level sensor unit and fuel pump" terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]



Removal and Installation

INFOID:000000005448600

FUEL PUMP

Refer to [FL-11](#).

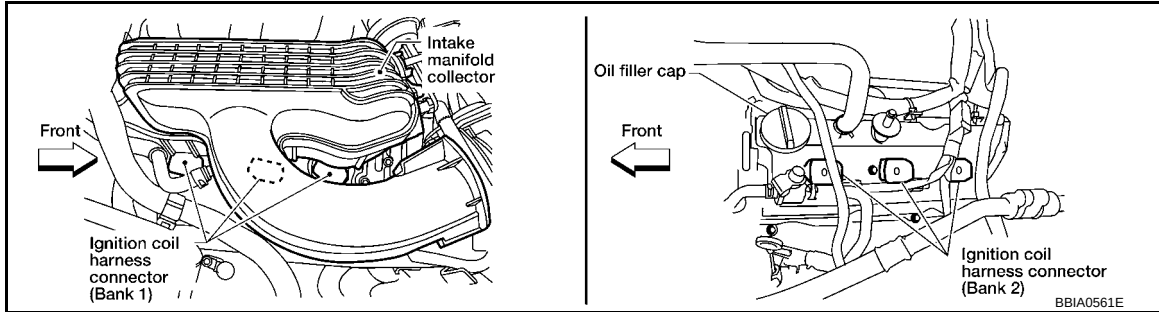
IGNITION SIGNAL

Component Description

INFOID:000000005448601

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



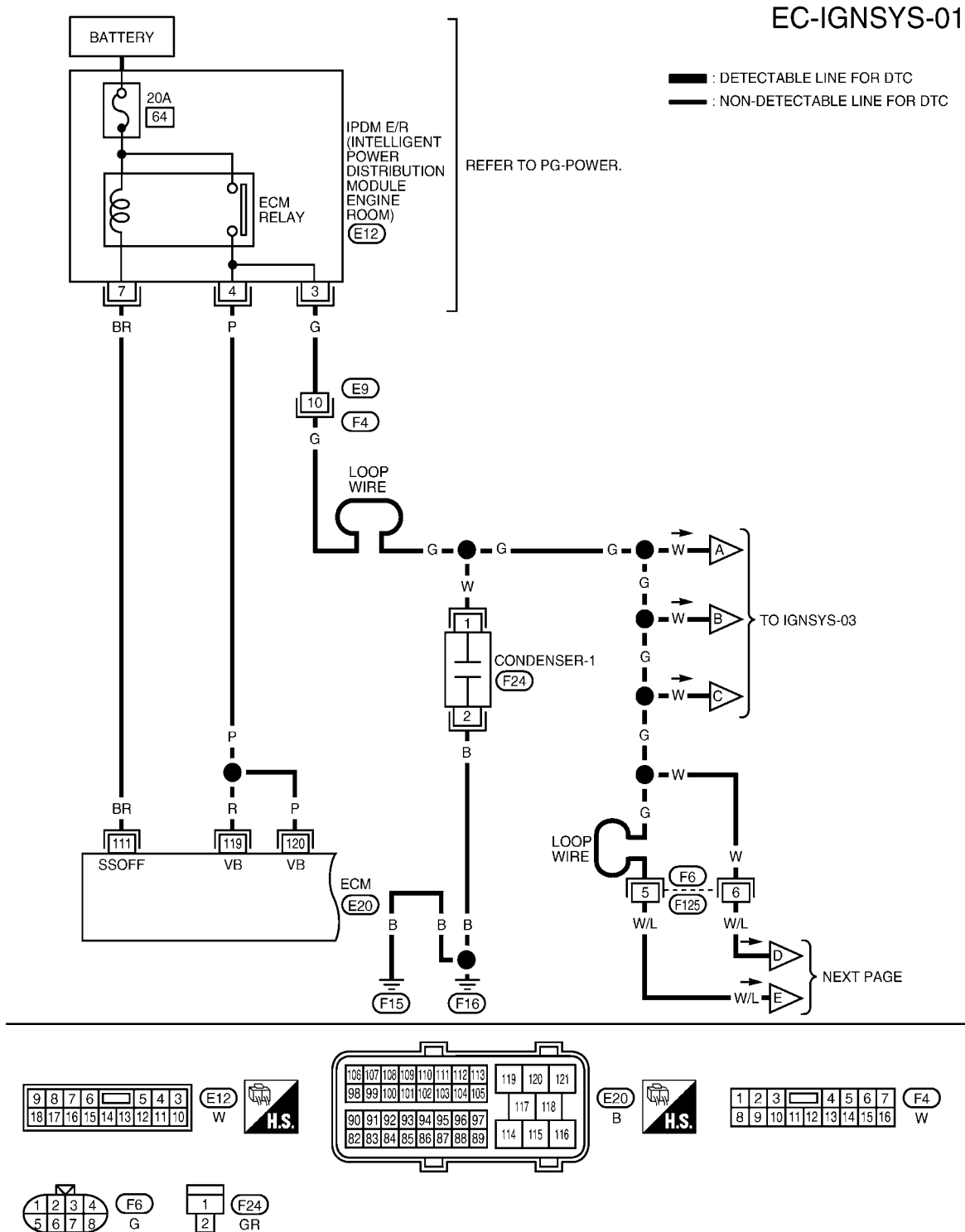
IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448602



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0448GB

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 1]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

A

EC

C

D

E

F

G

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I

J

K

L

M

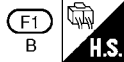
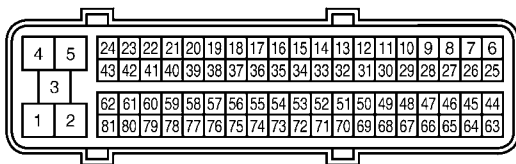
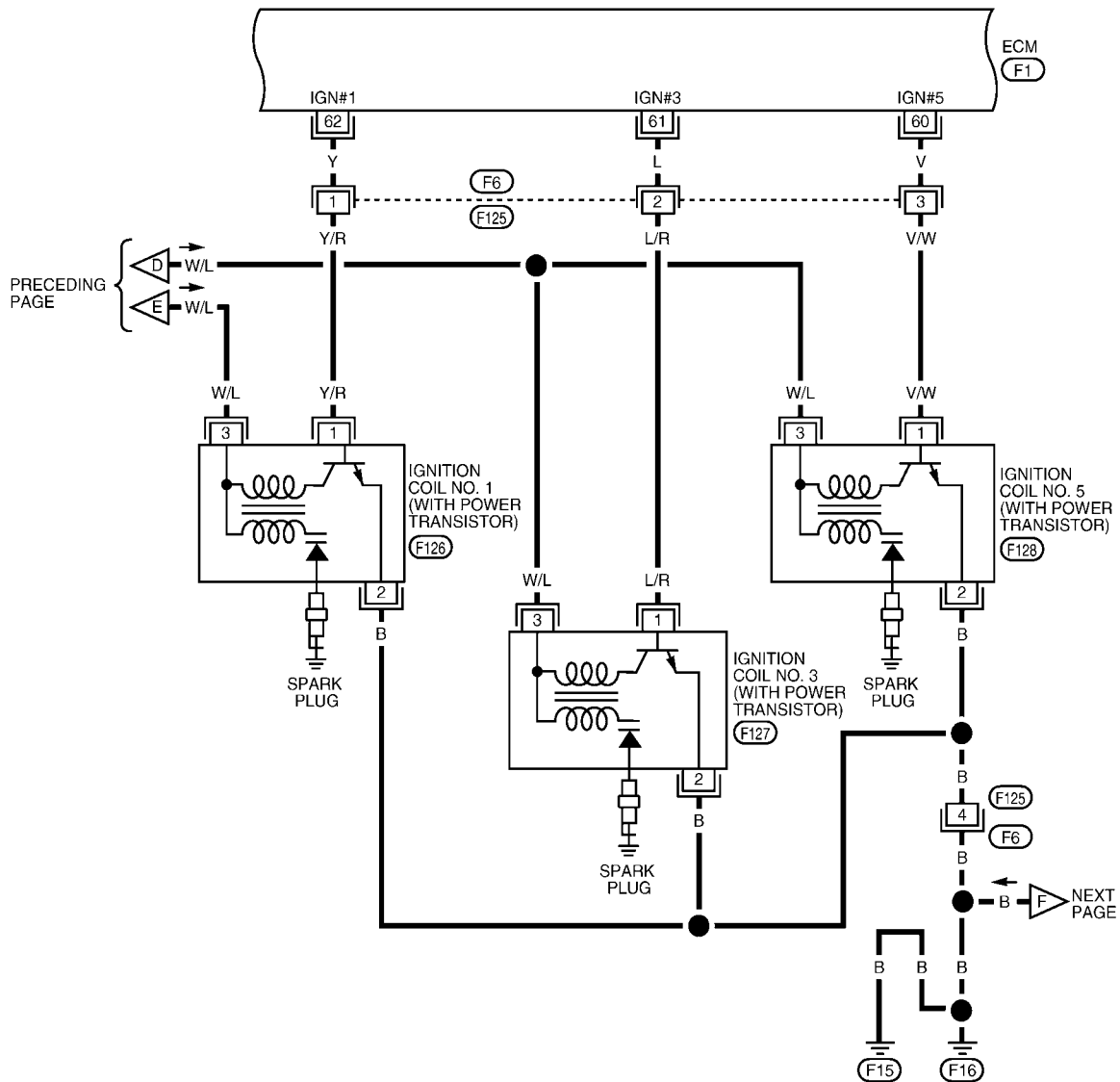
N

O

P

EC-IGNSYS-02

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

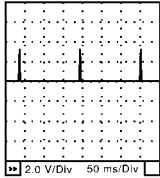
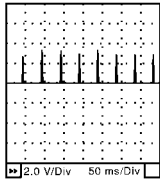
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

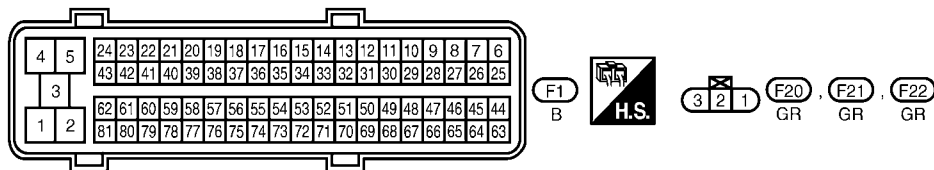
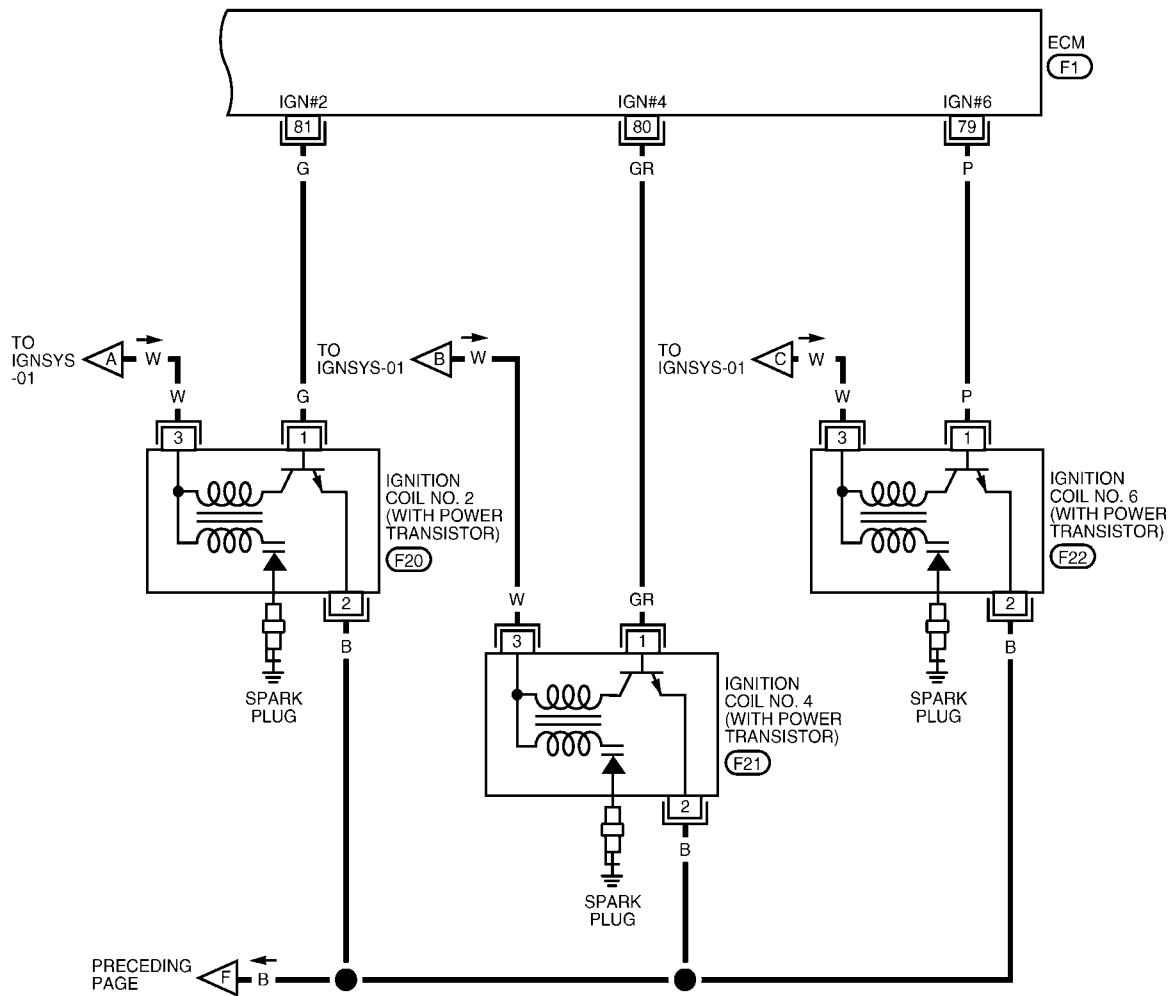
[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

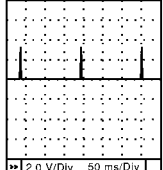
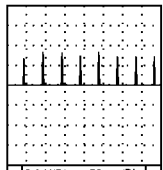
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79	P	Ignition signal No. 6	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
80	GR	Ignition signal No. 4		
81	G	Ignition signal No. 2		0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448603

1.CHECK ENGINE START

Turn ignition switch OFF, and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT)>>GO TO 2.

Yes (Without CONSULT)>>GO TO 3.

No >> GO TO 4.

2.CHECK OVERALL FUNCTION

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3.CHECK OVERALL FUNCTION

Without CONSULT

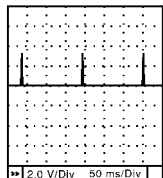
1. Let engine idle.

2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with an oscilloscope.

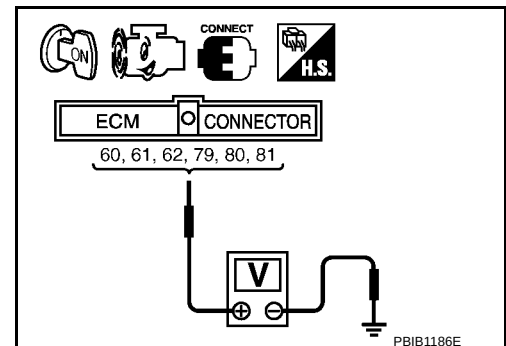
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:

The pulse cycle changes depending on rpm at idle.



SEC986C



OK or NG

IGNITION SIGNAL

[VQ TYPE 1]

< SERVICE INFORMATION >

- OK >> **INSPECTION END**
NG >> GO TO 10.

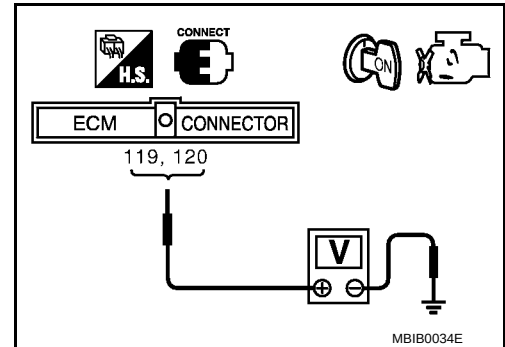
4.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT or tester.

Voltage: Battery voltage

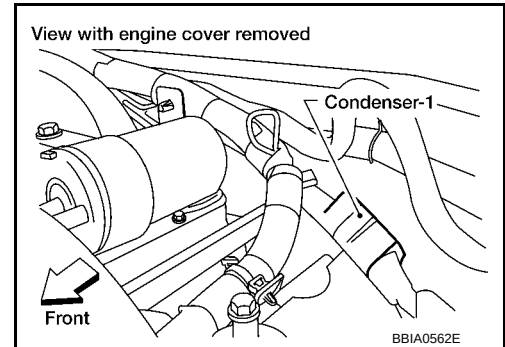
OK or NG

- OK >> GO TO 5.
NG >> Go to [EC-141](#).



5.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Turn ignition switch ON.

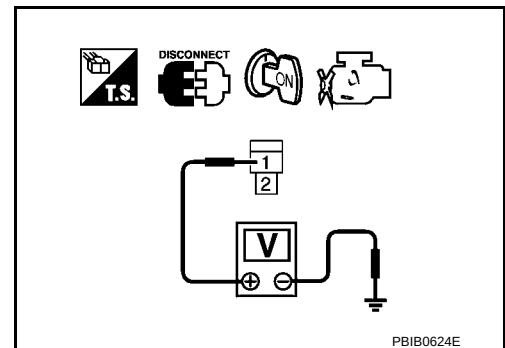


4. Check voltage between condenser-1 terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 17.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4

IGNITION SIGNAL

[VQ TYPE 1]

< SERVICE INFORMATION >

- Harness for open or short between condenser-1 and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

9.CHECK CONDENSER-1

Refer to [EC-508. "Component Inspection"](#).

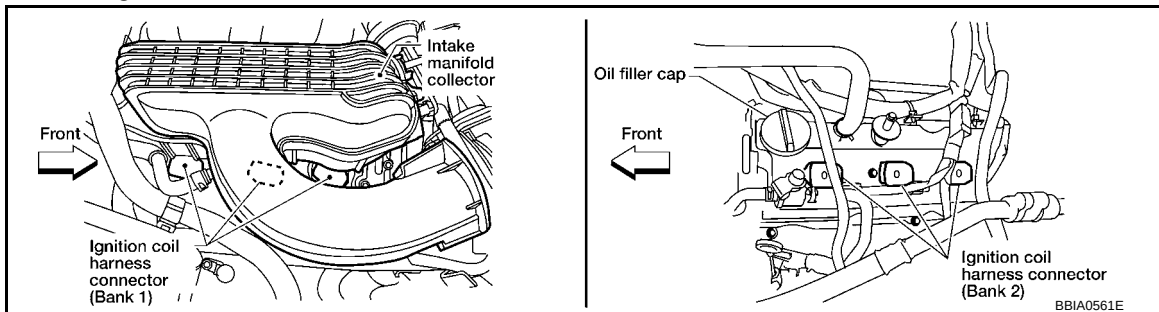
OK or NG

OK >> GO TO 10.

NG >> Replace condenser-1.

10.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.



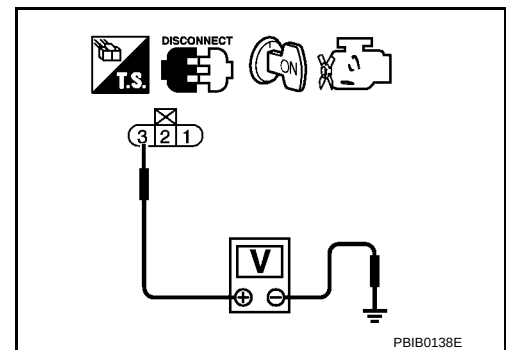
4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.



11.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and harness connector F4

>> Repair or replace harness or connectors.

12.CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.

< SERVICE INFORMATION >

Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 14.
- NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6
- Harness for open or short between ignition coil and ground

>> Repair open circuit or short to power in harness or connectors.

14.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 and ignition coil terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 16.
- NG >> GO TO 15.

15.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-508, "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
- NG >> Replace ignition coil with power transistor.

17.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448604

IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.

IGNITION SIGNAL

[VQ TYPE 1]

< SERVICE INFORMATION >

- Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

- If NG, Replace ignition coil with power transistor.
If OK, go to next step.
- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- Remove ignition coil and spark plug of the cylinder to be checked.
- Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- Connect spark plug and harness connector to ignition coil.
- Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
- Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

NOTE:

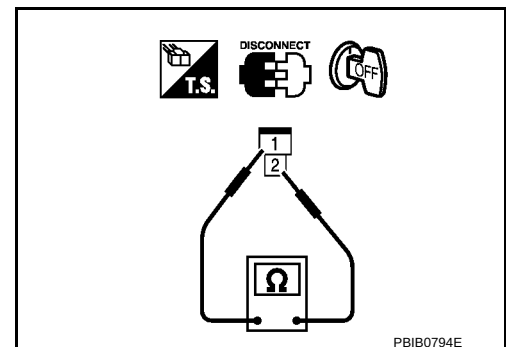
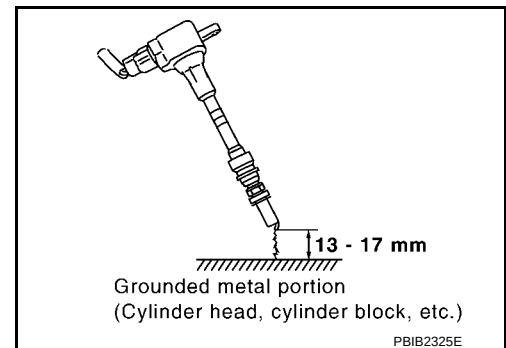
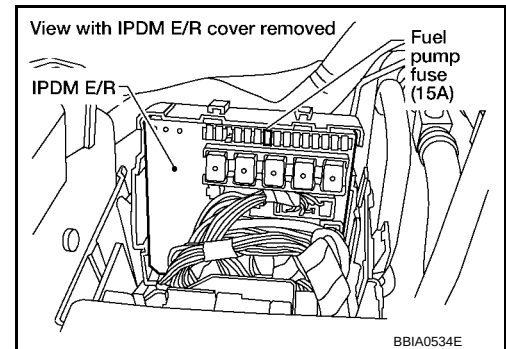
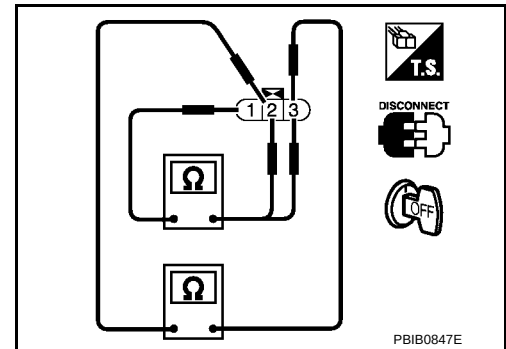
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

- If NG, Replace ignition coil with power transistor.

CONDENSER-1

- Turn ignition switch OFF.
- Disconnect condenser-1 harness connector.
- Check resistance between condenser-1 terminals 1 and 2.

Resistance	Above 1 M Ω at 25°C (77°F)



Removal and Installation

INFOID:000000005448605

IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-33](#).

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

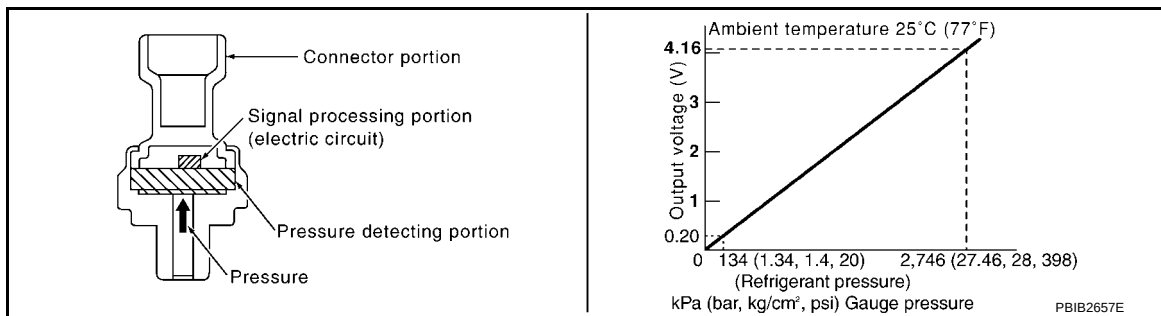
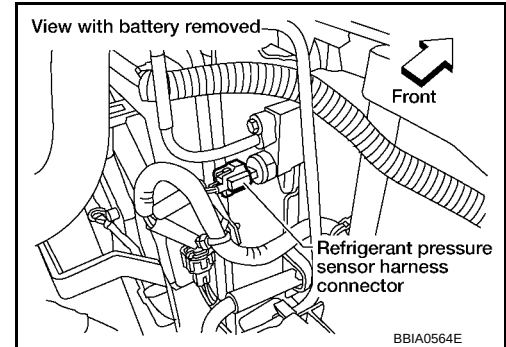
[VQ TYPE 1]

REFRIGERANT PRESSURE SENSOR

Component Description

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

INFOID:000000005448606



REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

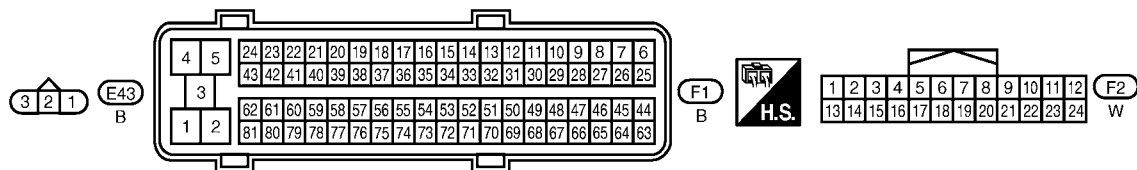
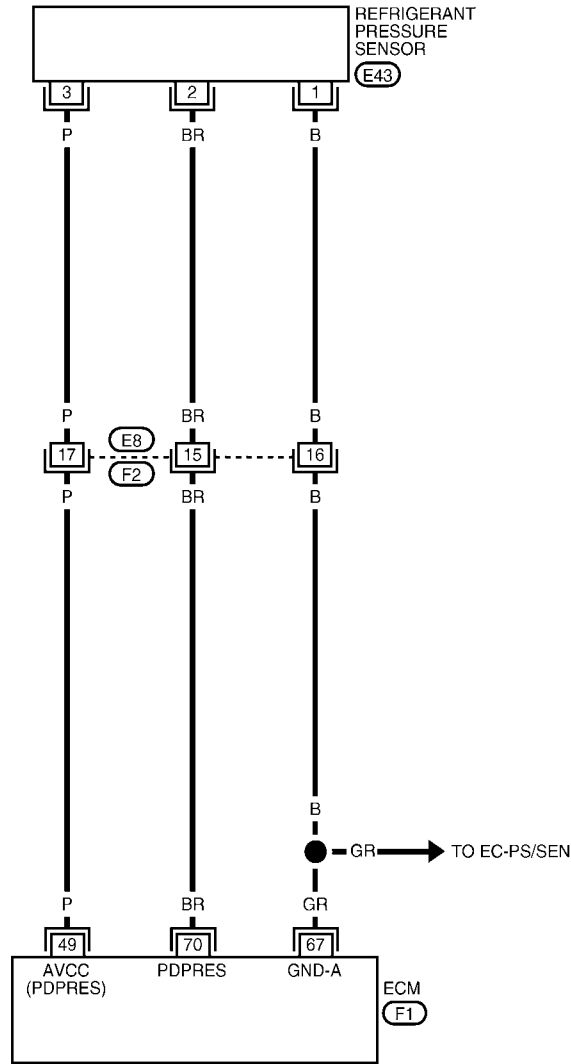
[VQ TYPE 1]

Wiring Diagram

INFOID:000000005448607

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1323E

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

[VQ TYPE 1]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
70	BR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V

Diagnosis Procedure

INFOID:000000005448608

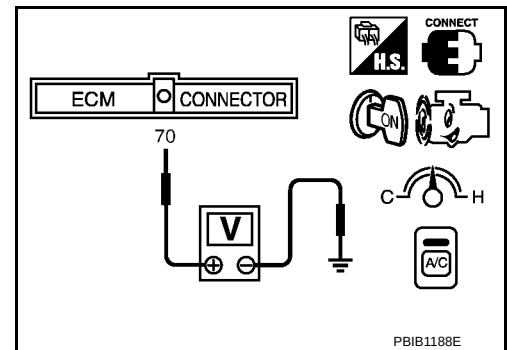
1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT or tester.

Voltage: 1.0 - 4.0V

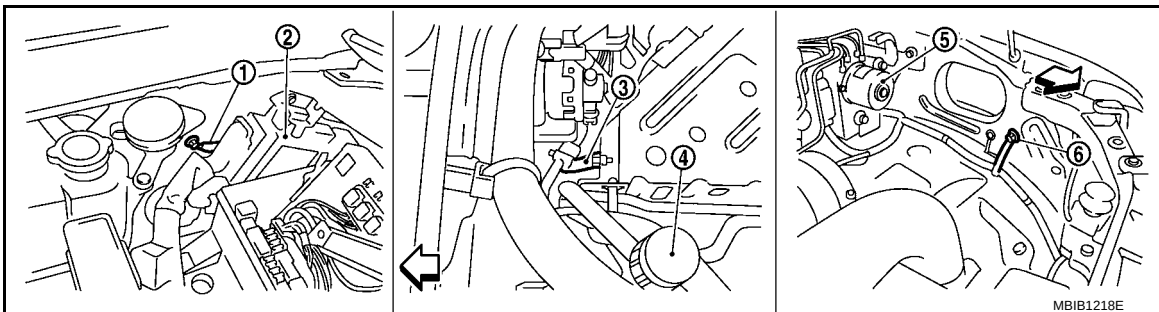
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



2.CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to [EC-147, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace ground connections.

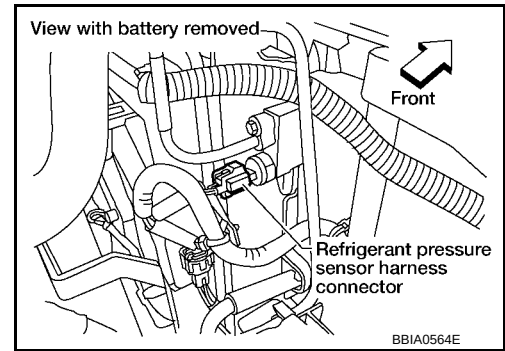
3.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

REFRIGERANT PRESSURE SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.

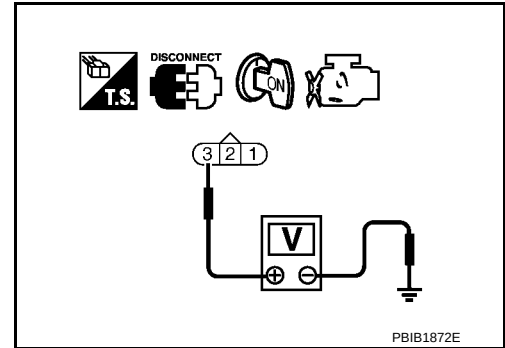


3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

5.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

REFRIGERANT PRESSURE SENSOR

[VQ TYPE 1]

< SERVICE INFORMATION >

- OK >> GO TO 9.
- NG >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

OK or NG

- OK >> Replace refrigerant pressure sensor.
- NG >> Repair or replace.

Removal and Installation

INFOID:000000005448609

REFRIGERANT PRESSURE SENSOR

Refer to [ATC-247. "Removal and Installation for Refrigerant Pressure Sensor"](#).

A
EC
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VIAS

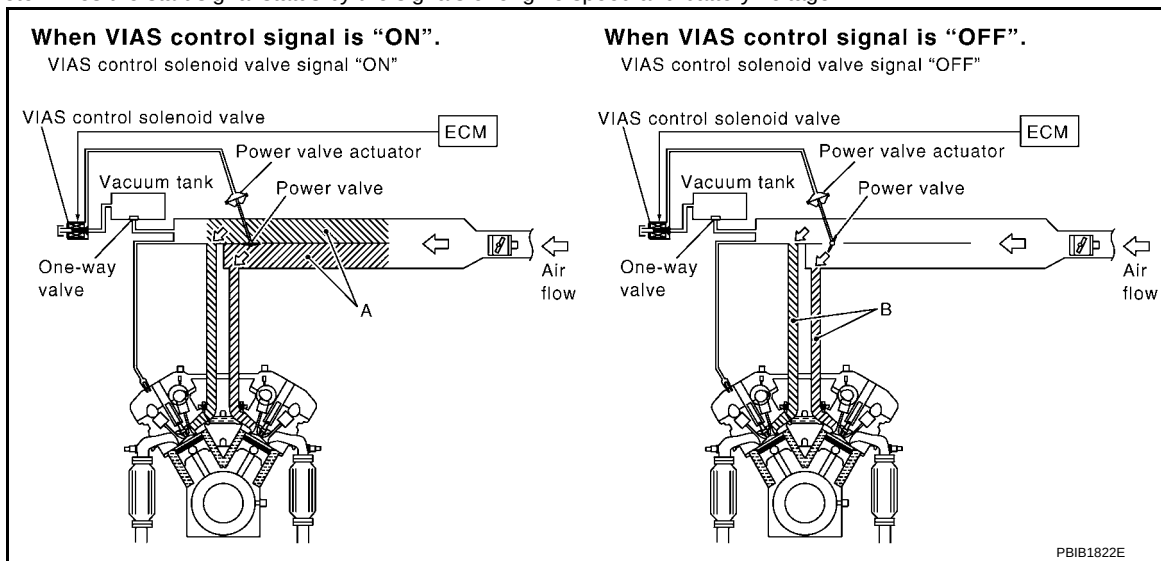
Description

INFOID:000000005448610

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.

Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.

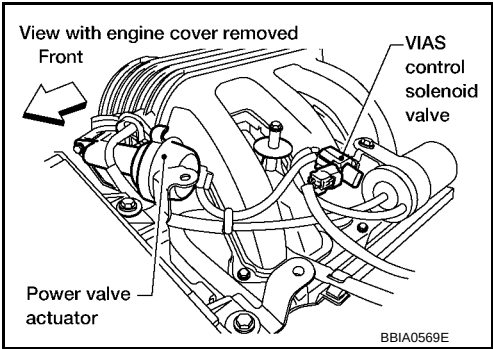
When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.

Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

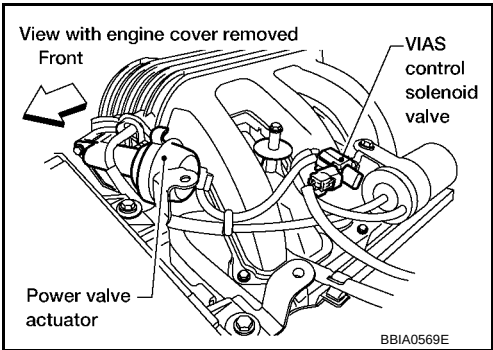
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448611

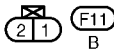
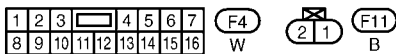
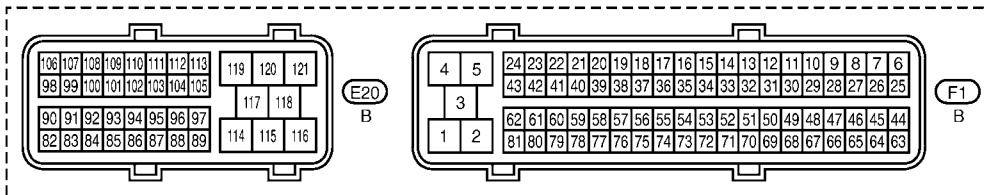
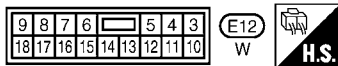
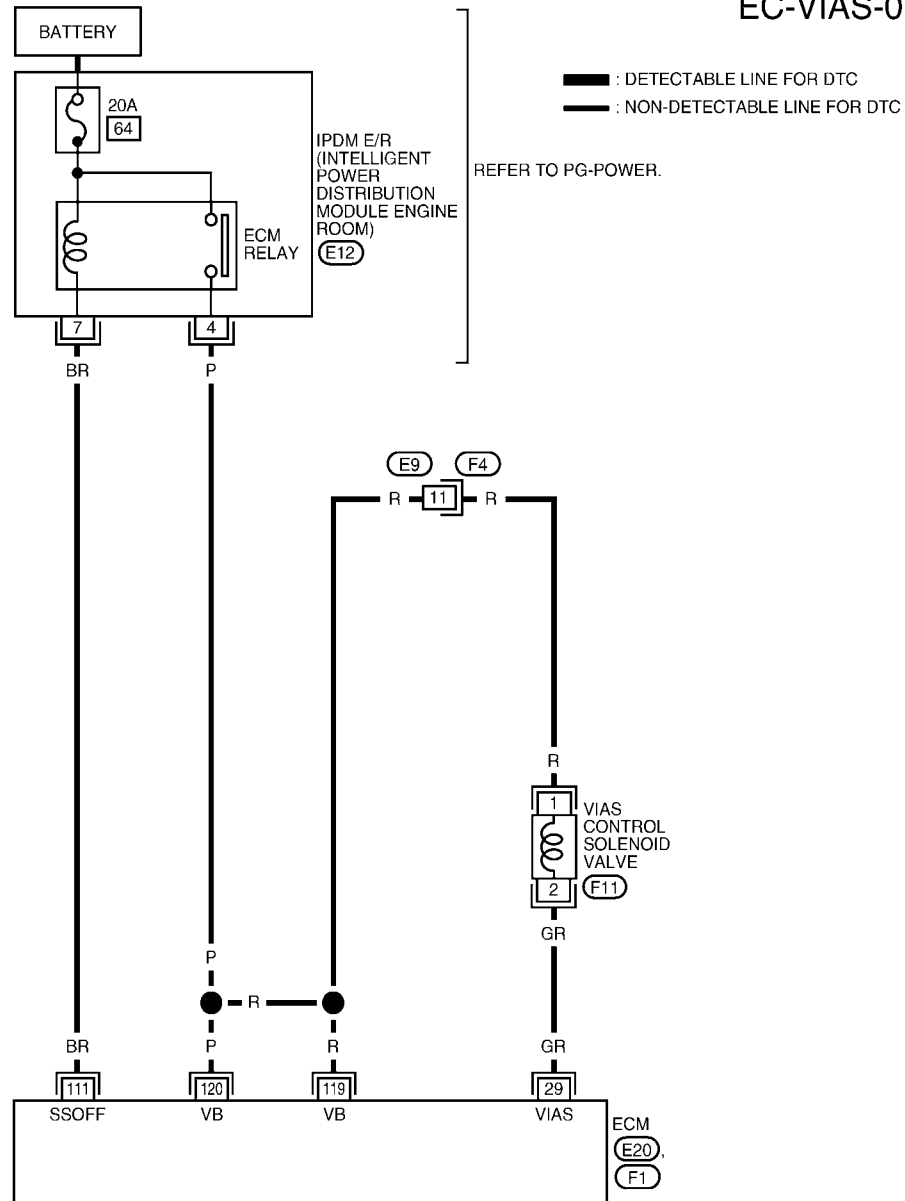
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	• Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF

Wiring Diagram

INFOID:000000005448612

EC-VIAS-01



JMBWA0450GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	GR	VIAS control solenoid valve	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

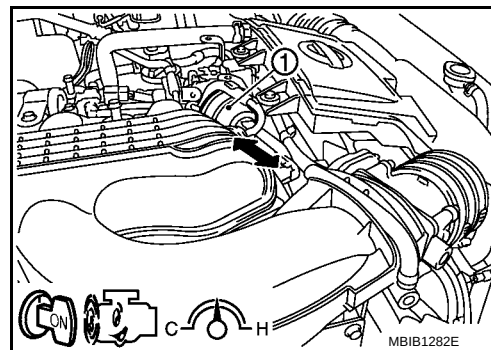
Diagnosis Procedure

INFOID:000000005448613

1. CHECK OVERALL FUNCTION

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT.
3. Turn VIAS control solenoid valve "ON" and "OFF", and make sure that power valve actuator (1) rod moves.



Without CONSULT

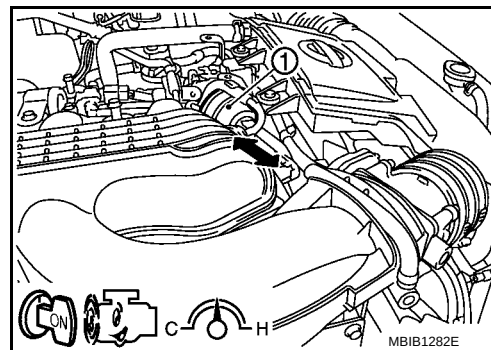
1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to between 2,200 and 3,300 rpm and make sure that power valve actuator (1) rod moves.

OK or NG

OK >> **INSPECTION END**

NG (With CONSULT) >>GO TO 2.

NG (Without CONSULT) >>GO TO 3.



2. CHECK VACUUM EXISTENCE

With CONSULT

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT.

< SERVICE INFORMATION >

4. Turn VIAS control solenoid valve "ON" and "OFF", and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

OK or NG

- OK >> Repair or replace power valve actuator.
 NG >> GO TO 4.

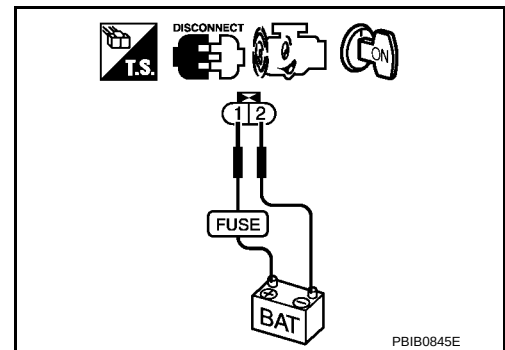
3.CHECK VACUUM EXISTENCE**⊗ Without CONSULT**

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

OK or NG

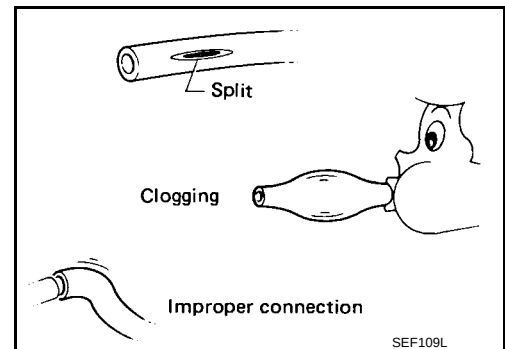
- OK >> Repair or replace power valve actuator.
 NG >> GO TO 4.

**4.CHECK VACUUM HOSE**

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to [EC-105. "Vacuum Hose Drawing"](#).

OK or NG

- OK >> GO TO 5.
 NG >> Repair hoses or tubes.

**5.CHECK VACUUM TANK**

Refer to [EC-522. "Component Inspection"](#).

OK or NG

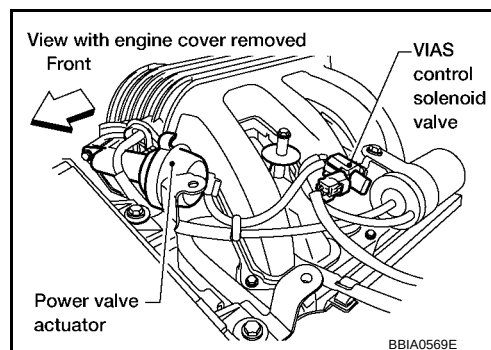
- OK >> GO TO 6.
 NG >> Replace vacuum tank.

6.CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

< SERVICE INFORMATION >

2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.

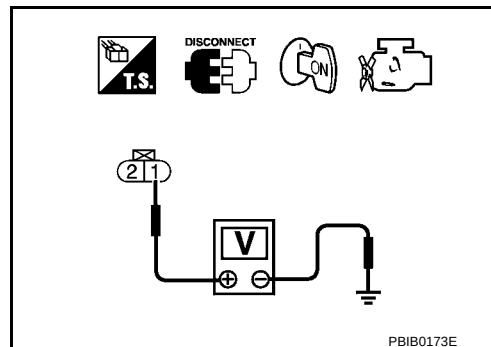


4. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
- Harness for open or short between VIAS control solenoid valve and ECM

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to [EC-522. "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-140](#).

>> INSPECTION END

Component Inspection

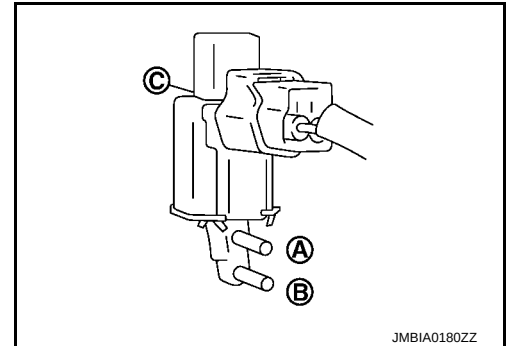
VIAS CONTROL SOLENOID VALVE

④ With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

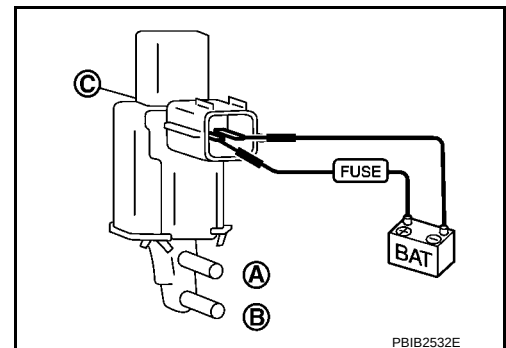


⊗ Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

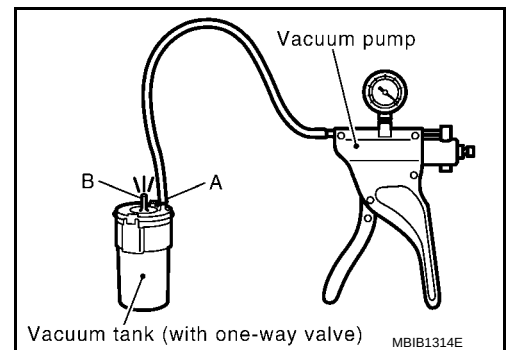
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



Removal and Installation

VIAS CONTROL SOLENOID VALVE

Refer to [EM-21](#).

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

[VQ TYPE 1]

MIL AND DATA LINK CONNECTOR

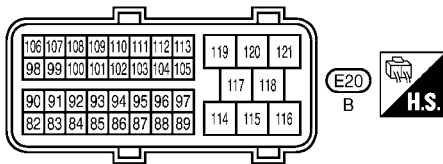
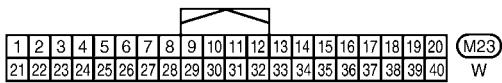
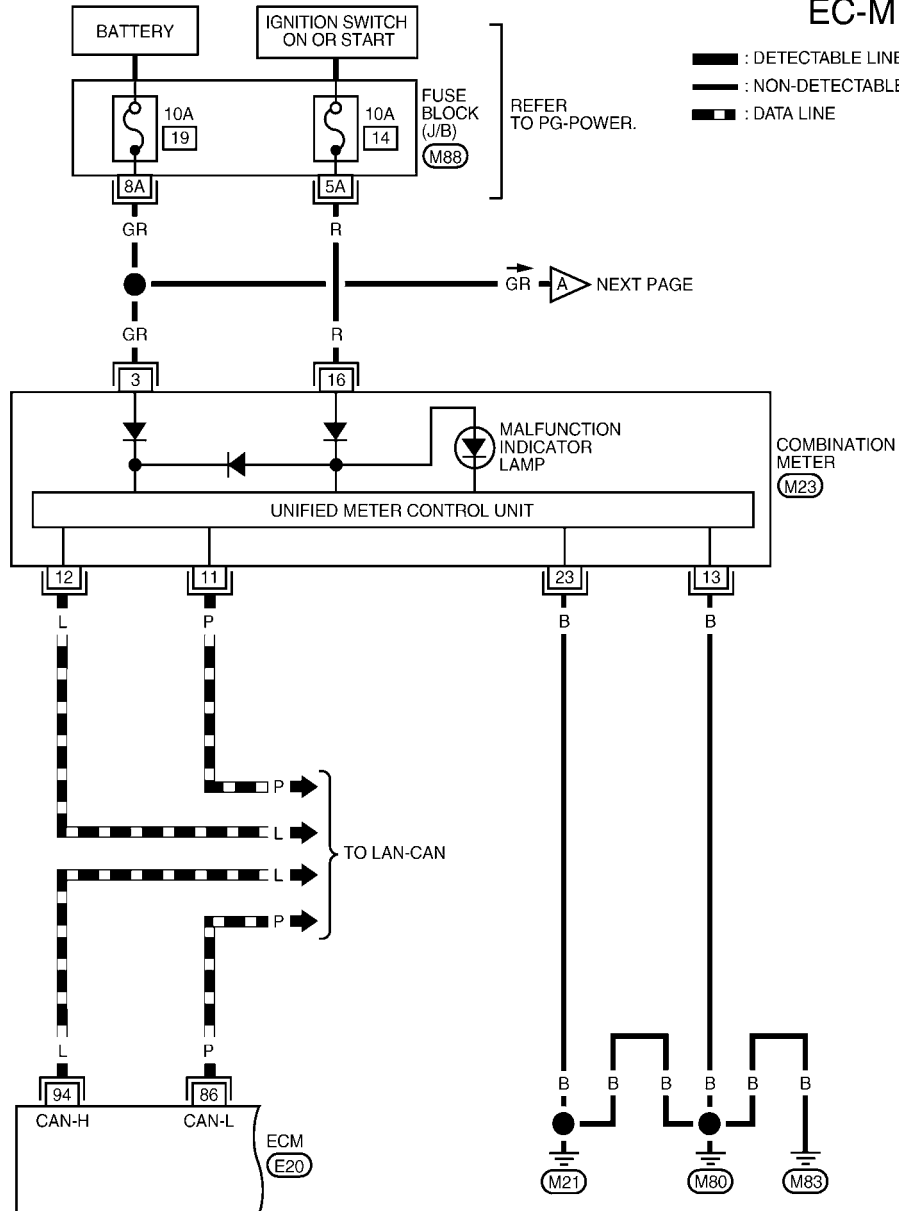
Wiring Diagram

INFOID:000000005448616

EC-MIL/DL-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- : DATA LINE

REFER TO PG-POWER.



REFER TO THE FOLLOWING.
(M88) - FUSE BLOCK -
JUNCTION BOX (J/B)

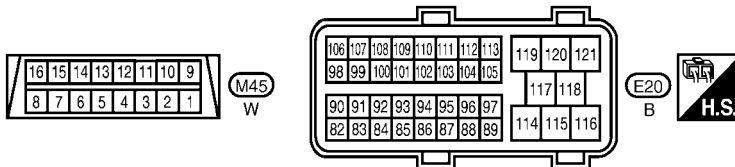
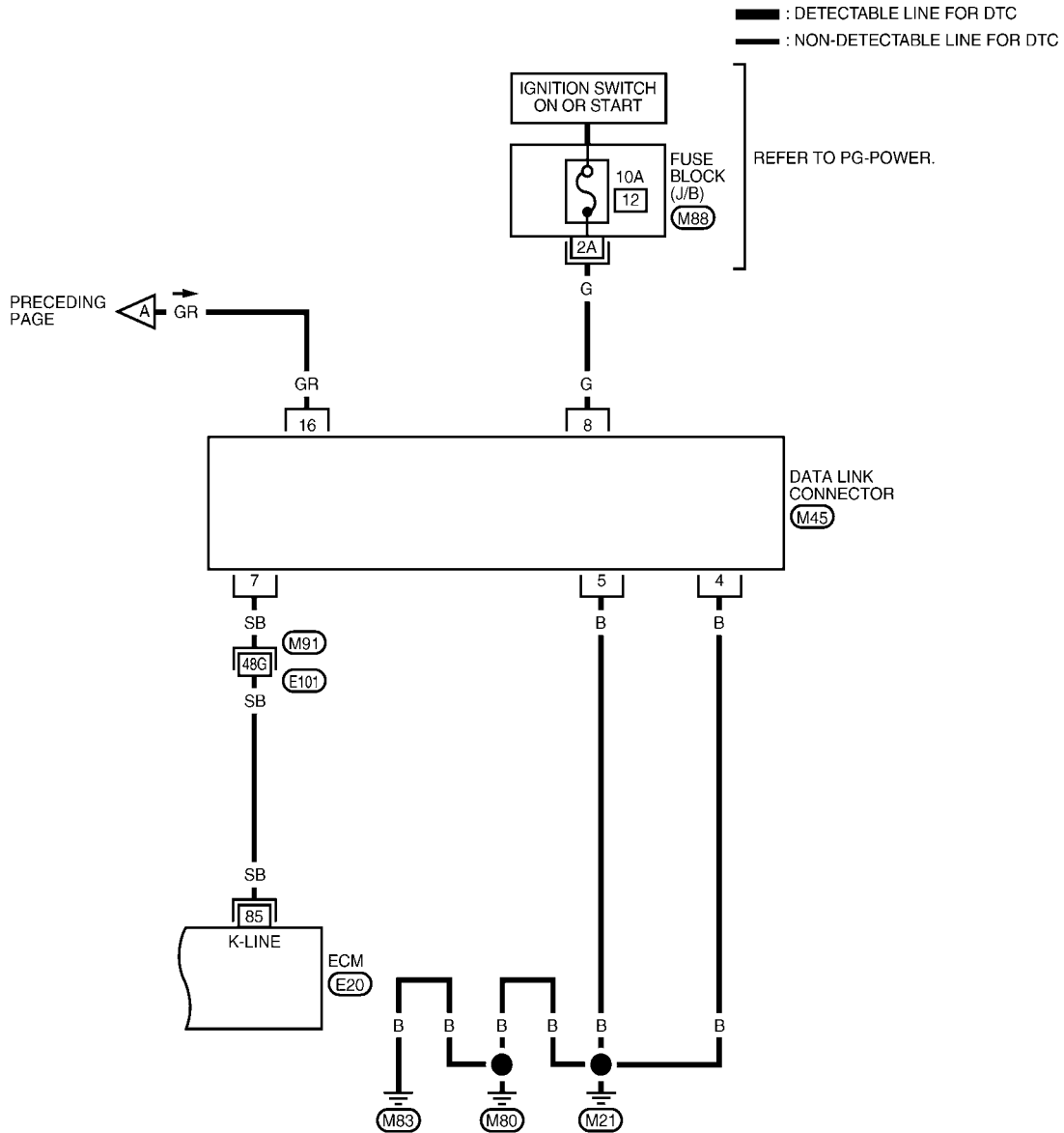
JMBWA0451GB

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

[VQ TYPE 1]

EC-MIL/DL-02



MBWA1327E

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VQ TYPE 1]

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:000000005448617

Fuel pressure at idling kPa (bar, kg/cm ² , psi)	Approximately 350 (3.5, 3.57, 51)

Idle Speed and Ignition Timing

INFOID:000000005448618

Target idle speed	No load* [in P or N position (A/T), Neutral position (M/T)]	625 ± 50 rpm
Air conditioner: ON	In P or N position (A/T), Neutral position (M/T)	775 rpm or more
Ignition timing	In P or N position (A/T), Neutral position (M/T)	15 ± 5° BTDC

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:000000005448619

Condition	Calculated load value% (Using CONSULT or GST)
At idle	5 - 35
At 2,500 rpm	5 - 35

Mass Air Flow Sensor

INFOID:000000005448620

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.2V*
Mass air flow (Using CONSULT or GST)	2.0 - 6.0 g/s at idle* 7.0 - 20.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

INFOID:000000005448621

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:000000005448622

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:000000005448623

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen sensor 2 Heater

INFOID:000000005448624

Resistance [at 25°C (77°F)]	9.9 - 13.3Ω

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VQ TYPE 1]

Crankshaft Position Sensor (POS)

INFOID:000000005448625

Refer to [EC-246. "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

INFOID:000000005448626

Refer to [EC-255. "Component Inspection"](#).

Throttle Control Motor

INFOID:000000005448627

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

INFOID:000000005448628

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω

Fuel Pump

INFOID:000000005448629

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

SERVICE INFORMATION

APPLICATION NOTICE

How to Check Vehicle Type

INFOID:0000000005448630

Check the vehicle type (refer to [GI-47](#)) to confirm the service information in EC section.

Service information	Remarks
VQ TYPE 1	Models for Australia
VQ TYPE 2	Models except for Australia

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

INDEX FOR DTC

< SERVICE INFORMATION >

[VQ TYPE 2]

INDEX FOR DTC

U1000 - U1001

INFOID:000000005448631

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
U1000	1000*3	CAN COMM CIRCUIT	EC-629
U1001	1001*3	CAN COMM CIRCUIT	EC-629

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: The troubleshooting for this DTC needs CONSULT.

P0011 - P0223

INFOID:000000005448632

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P0011	0011	INT/V TIM CONT-B1	EC-631
P0021	0021	INT/V TIM CONT-B2	EC-631
P0102	0102	MAF SEN/CIRCUIT	EC-636
P0103	0103	MAF SEN/CIRCUIT	EC-636
P0117	0117	ECT SEN/CIRC	EC-643
P0118	0118	ECT SEN/CIRC	EC-643
P0122	0122	TP SEN 2/CIRC	EC-648
P0123	0123	TP SEN 2/CIRC	EC-648
P0222	0222	TP SEN 1/CIRC	EC-655
P0223	0223	TP SEN 1/CIRC	EC-655

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0327 - P0605

INFOID:000000005448633

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P0327	0327	KNOCK SEN/CIRC-B1	EC-662
P0328	0328	KNOCK SEN/CIRC-B1	EC-662
P0332	0332	KNOCK SEN/CIRC-B2	EC-662
P0333	0333	KNOCK SEN/CIRC-B2	EC-662
P0335	0335	CKP SEN/CIRCUIT	EC-667
P0340	0340	CMP SEN/CIRC-B1	EC-673

INDEX FOR DTC

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P0345	0345	CMP SEN/CIRC-B2	EC-673
P0550	0550	PW ST P SEN/CIRC	EC-682
P0605	0605	ECM	EC-687

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1031 - P1136

INFOID:000000005448634

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P1031	1031	A/F SEN1 HTR (B1)	EC-689
P1032	1032	A/F SEN1 HTR (B1)	EC-689
P1051	1051	A/F SEN1 HTR (B2)	EC-689
P1052	1052	A/F SEN1 HTR (B2)	EC-689
P1065	1065	ECM BACK UP/CIRCUIT	EC-696
P1111	1111	INT/V TIM V/CIR-B1	EC-700
P1121	1121	ETC ACTR	EC-707
P1122	1122	ETC FUNCTION/CIRC	EC-709
P1124	1124	ETC MOT PWR	EC-715
P1126	1126	ETC MOT PWR	EC-715
P1128	1128	ETC MOT	EC-720
P1136	1136	INT/V TIM V/CIR-B2	EC-700

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1217 - P1286

INFOID:000000005448635

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P1217	1217	ENG OVER TEMP	EC-724
P1225	1225	CTP LEARNING	EC-733
P1226	1226	CTP LEARNING	EC-735
P1229	1229	SENSOR POWER/CIRC	EC-737
P1271	1271	A/F SENSOR1 (B1)	EC-744
P1272	1272	A/F SENSOR1 (B1)	EC-752
P1276	1276	A/F SENSOR1 (B1)	EC-760
P1281	1281	A/F SENSOR1 (B2)	EC-744
P1282	1282	A/F SENSOR1 (B2)	EC-752
P1286	1286	A/F SENSOR1 (B2)	EC-760

INDEX FOR DTC

< SERVICE INFORMATION >

[VQ TYPE 2]

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1564 - P1805

INFOID:000000005448636

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P1564	1564	ASCD SW	EC-768
P1572	1572	ASCD BRAKE SW	EC-774
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-552
P1706	1706	P-N POS SW/CIRCUIT	EC-786
P1715	1715	IN PLUY SPEED	EC-791
P1805	1805	BRAKE SW/CIRCUIT	EC-792

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P2122 - P2138

INFOID:000000005448637

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

DTC*1		Items (CONSULT screen terms)	Reference page
CONSULT	ECM*2		
P2122	2122	APP SEN 1/CIRC	EC-797
P2123	2123	APP SEN 1/CIRC	EC-797
P2127	2127	APP SEN 2/CIRC	EC-803
P2128	2128	APP SEN 2/CIRC	EC-803
P2135	2135	TP SENSOR	EC-810
P2138	2138	APP SENSOR	EC-817

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006135648

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

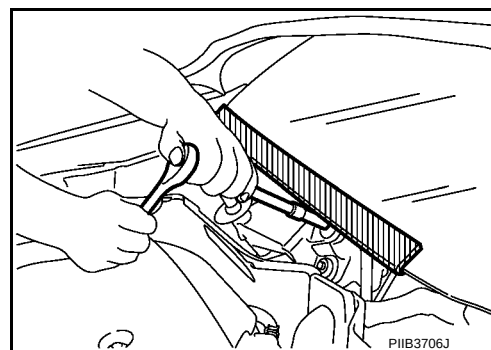
WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000006135705

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



On Board Diagnosis (OBD) System of Engine

INFOID:0000000005448640

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-82](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

PRECAUTIONS

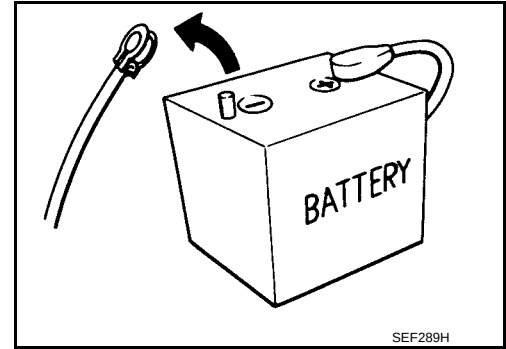
< SERVICE INFORMATION >

[VQ TYPE 2]

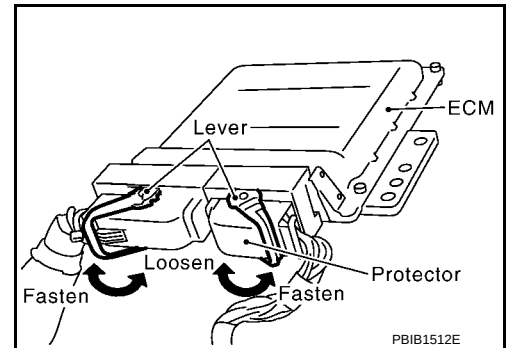
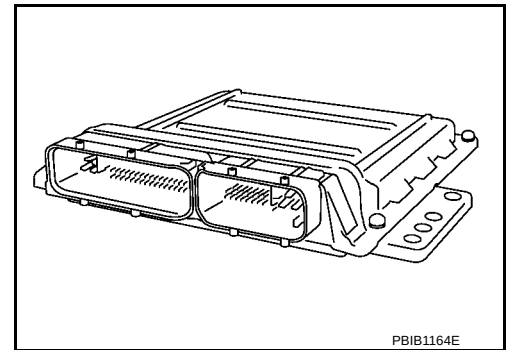
Precaution

INFOID:000000005448641

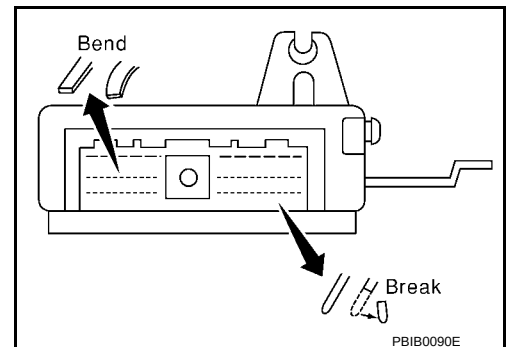
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.



- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.

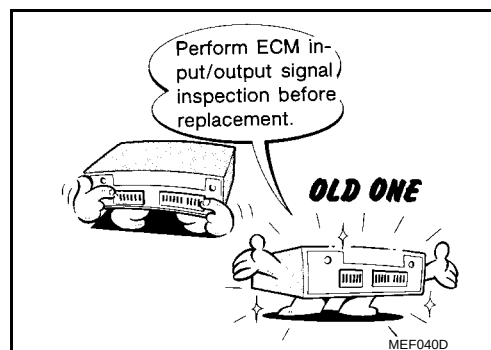


PRECAUTIONS

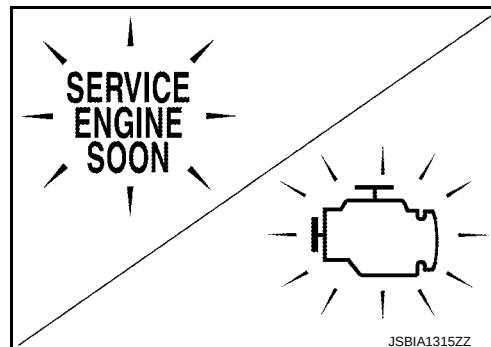
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[VQ TYPE 2]

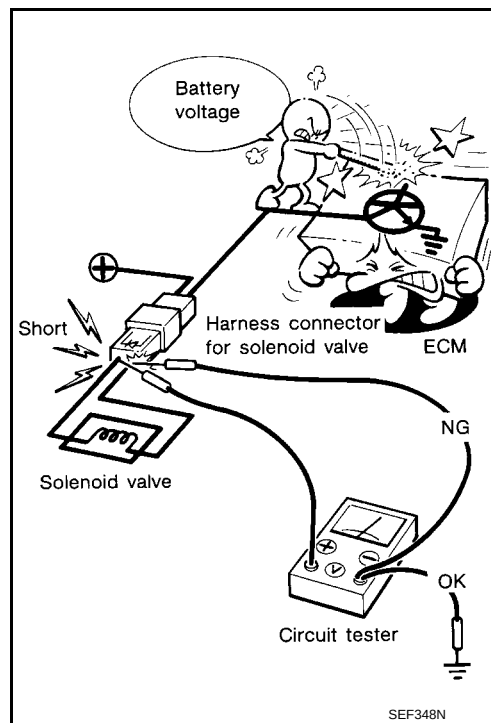
- Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to [EC-591, "ECM Terminal and Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

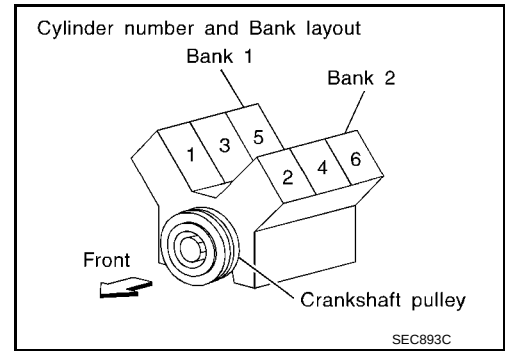


PRECAUTIONS

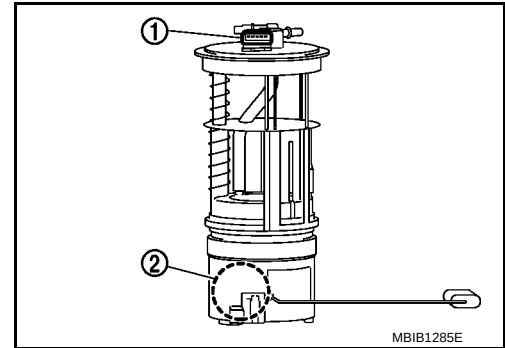
< SERVICE INFORMATION >

[VQ TYPE 2]

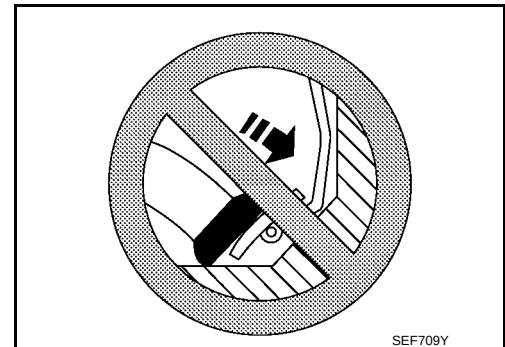
- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.



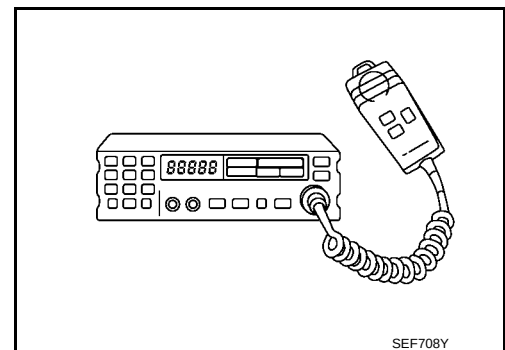
- Do not operate fuel pump when there is no fuel in lines.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Tighten fuel hose clamps to the specified torque.



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

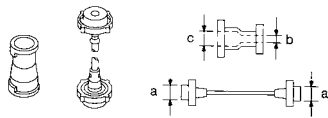
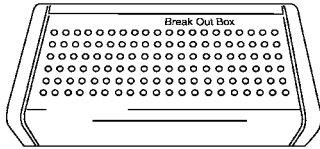
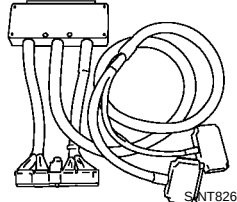
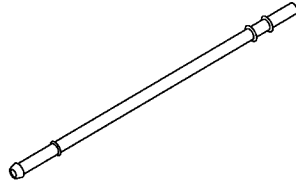
< SERVICE INFORMATION >

[VQ TYPE 2]

PREPARATION

Special Service Tool

INFOID:000000005448642

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester
KV101118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

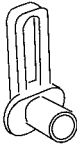
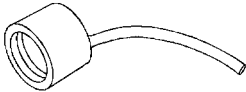
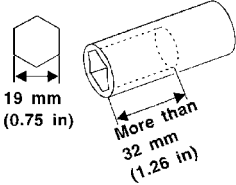
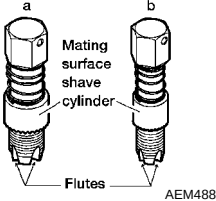
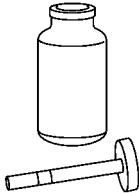
PREPARATION

< SERVICE INFORMATION >

[VQ TYPE 2]

Commercial Service Tool

INFOID:000000005448643

Tool name	Description
Quick connector re-lease  PBIC0198E	Remove fuel tube quick connectors in engine room
Fuel filler cap adapter  S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

Schematic

INFOID:000000005448644

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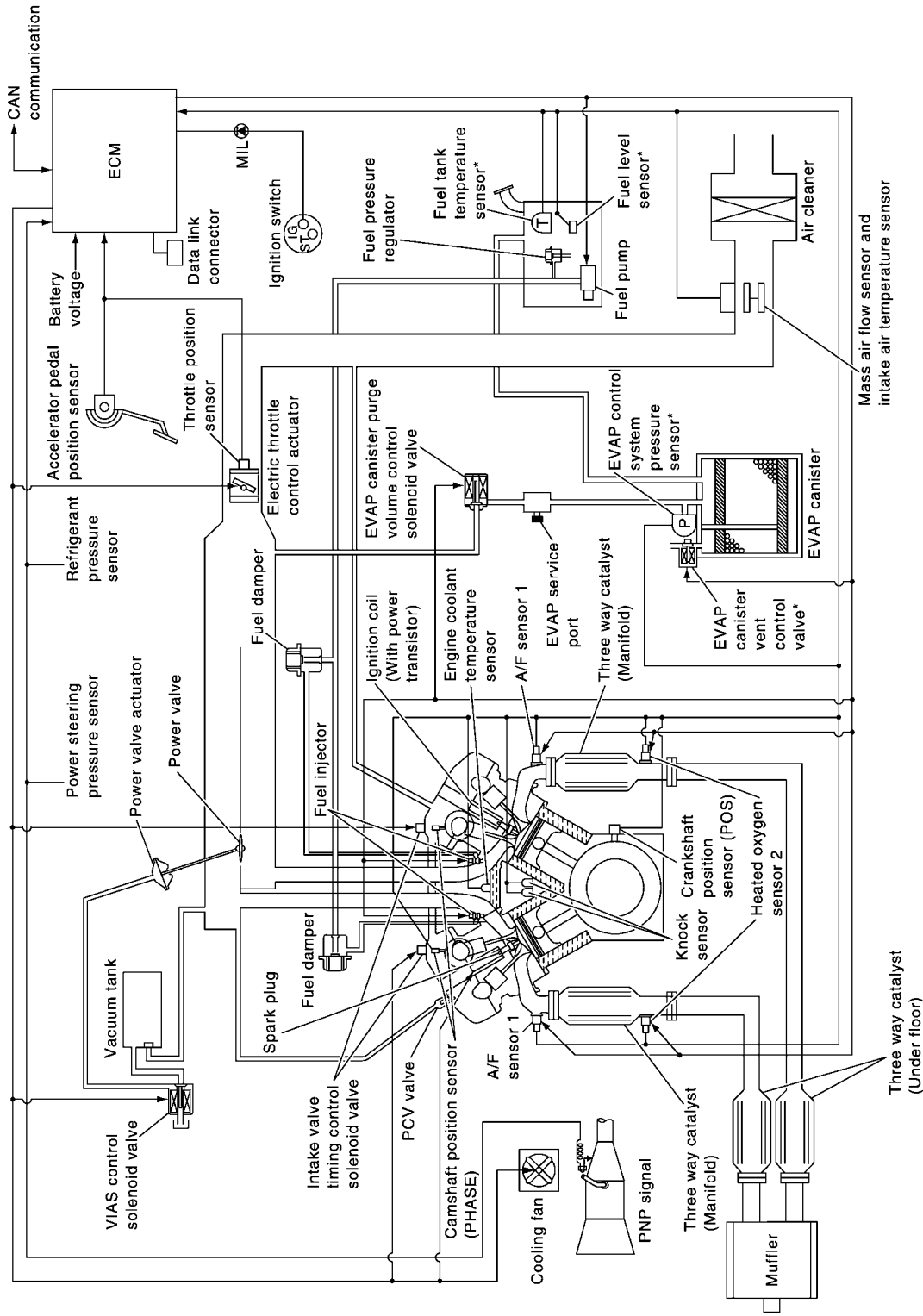
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*: This sensor/actuator is not for controlling the engine system, nor for the on board diagnosis.

JPBIA3537GB

Multiport Fuel Injection (MFI) System

INFOID:000000005448645

INPUT/OUTPUT SIGNAL CHART

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ³	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
TCM	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage* ³		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2* ¹	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation* ²		
Wheel sensor	Vehicle speed* ²		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

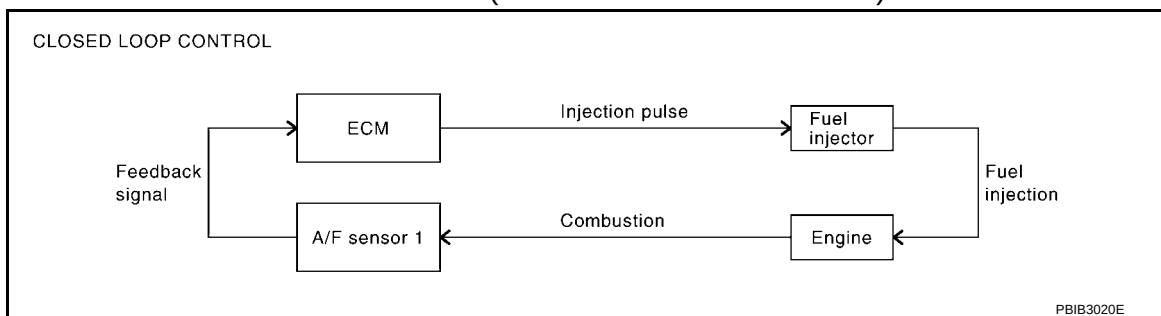
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air

< SERVICE INFORMATION >

fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to [EC-744](#). This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

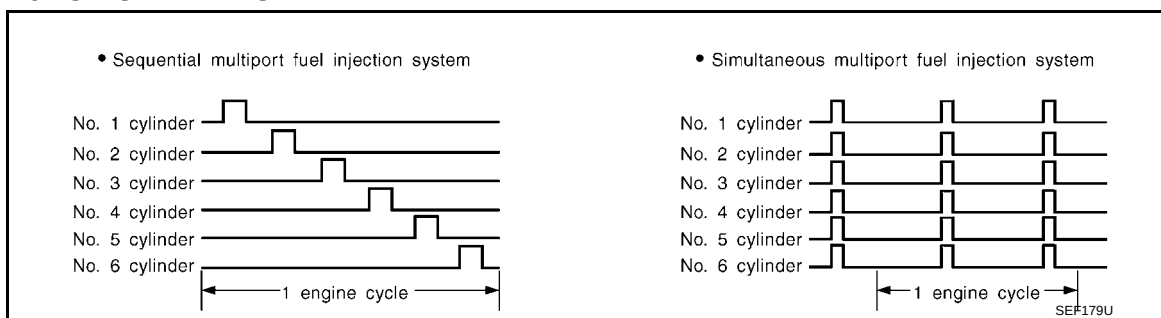
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six fuel injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

INFOID:000000005448646

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
TCM	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1-2-3-4-5-6

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:000000005448647

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
TCM	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under [EC-537. "Multiport Fuel Injection \(MFI\) System"](#).

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AIR CONDITIONING CUT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 2]

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:000000005448648

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal* ¹	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ²		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ²		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed* ¹		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

System Description

INFOID:000000005448649

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

[VQ TYPE 2]

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:000000005448650

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD steering switch	ASCD steering switch operation		
TCM	Gear position Powertrain revolution*		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by depressing SET/COAST switch or RESUME/ACCELERATE switch.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

[VQ TYPE 2]

< SERVICE INFORMATION >

When the RESUME/ACCELERATE switch is pressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 175 km/h (109 MPH)

Component Description

INFOID:000000005448651

ASCD STEERING SWITCH

Refer to [EC-768](#).

ASCD BRAKE SWITCH

Refer to [EC-774](#) and [EC-824](#).

STOP LAMP SWITCH

Refer to [EC-774](#), [EC-792](#) and [EC-824](#).

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EC-707](#), [EC-709](#), [EC-715](#) and [EC-720](#).

ASCD INDICATOR

Refer to [EC-834](#).

CAN COMMUNICATION

System Description

INFOID:000000005448652

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-46. "CAN System Specification Chart"](#), about CAN communication for detail.

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EVAPORATIVE EMISSION SYSTEM

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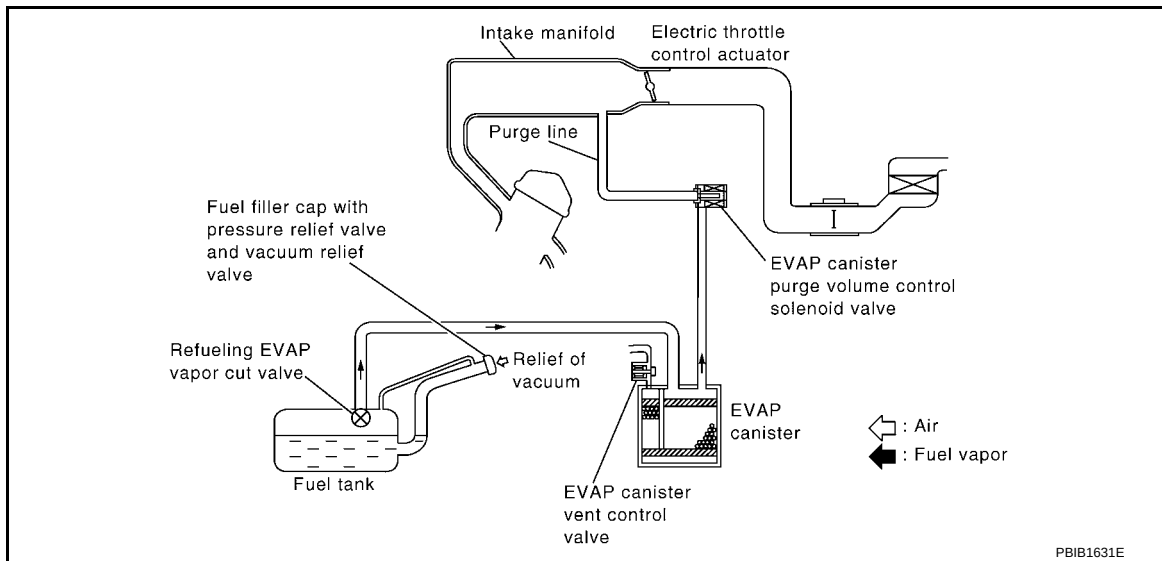
[VQ TYPE 2]

EVAPORATIVE EMISSION SYSTEM

Description

INFOID:000000005448653

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

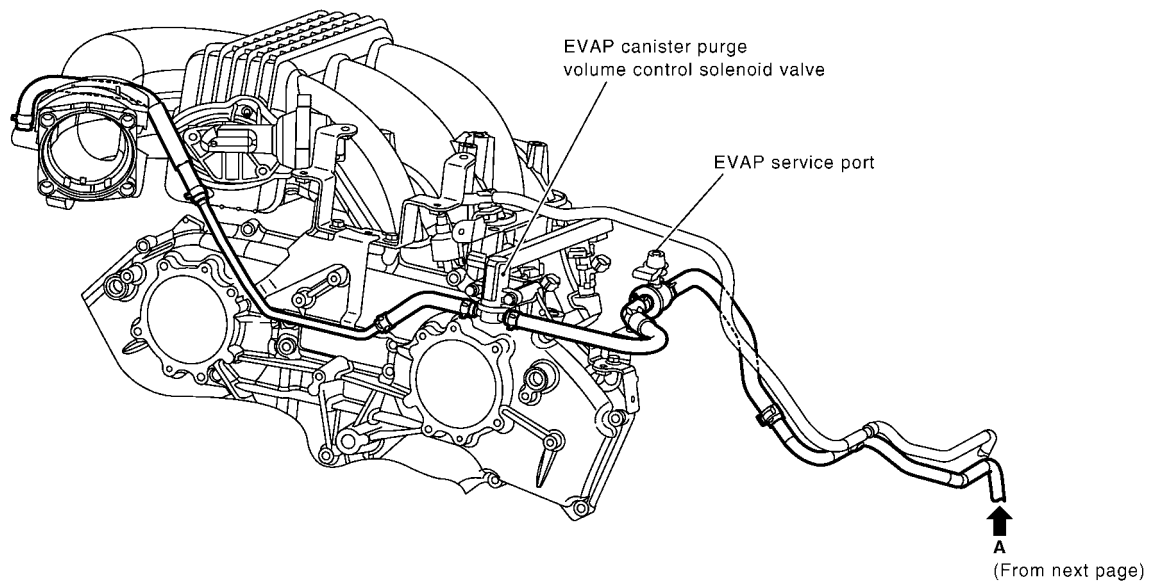
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION SYSTEM

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[VQ TYPE 2]

EVAPORATIVE EMISSION LINE DRAWING



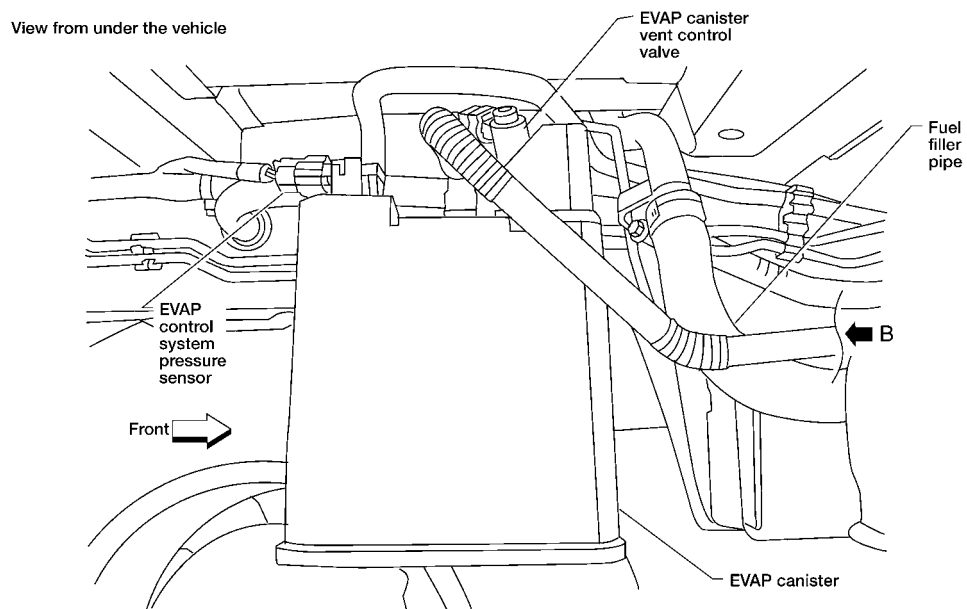
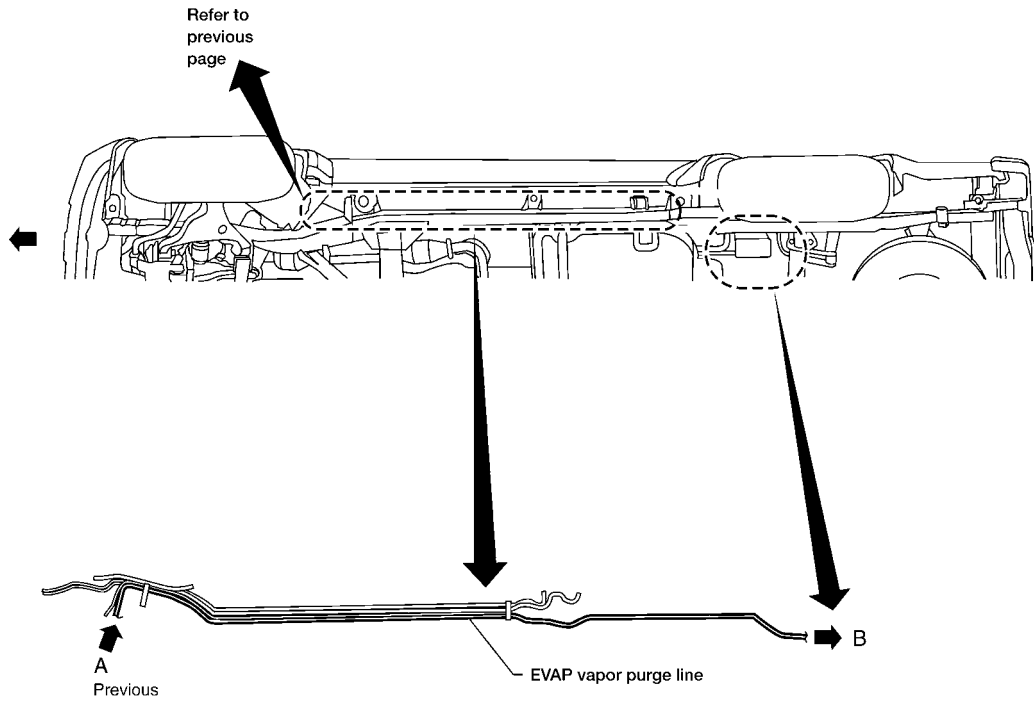
NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB2774E

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]



BBIA0594E

INFOID:000000005448654

Component Inspection

EVAP CANISTER

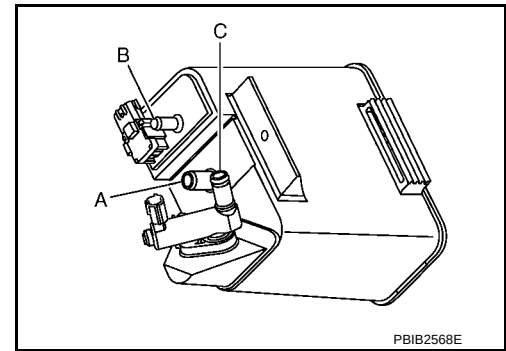
EVAPORATIVE EMISSION SYSTEM

[VQ TYPE 2]

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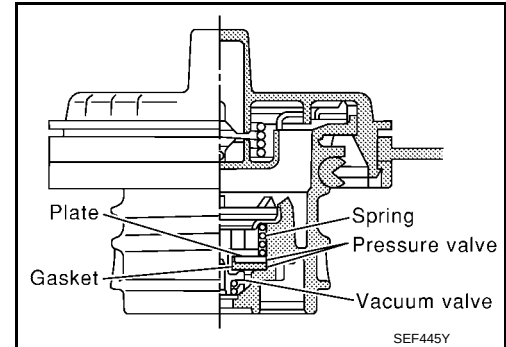
Check EVAP canister as follows:

1. Block port **B**.
2. Blow air into port **A** and check that it flows freely out of port **C**.
3. Release blocked port **B**.
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C**.
5. Block port **A** and **B**.
6. Apply pressure to port **C** and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

1. Wipe clean valve housing.

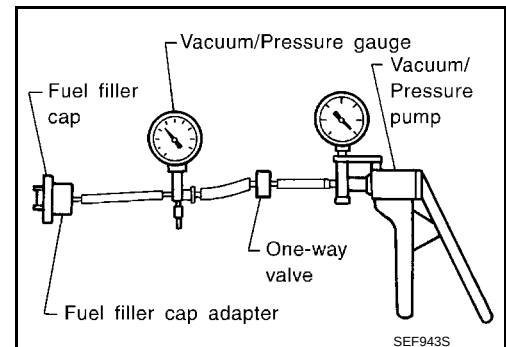


2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.060 to -0.033 bar, -0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-843](#).

EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-848](#).

POSITIVE CRANKCASE VENTILATION

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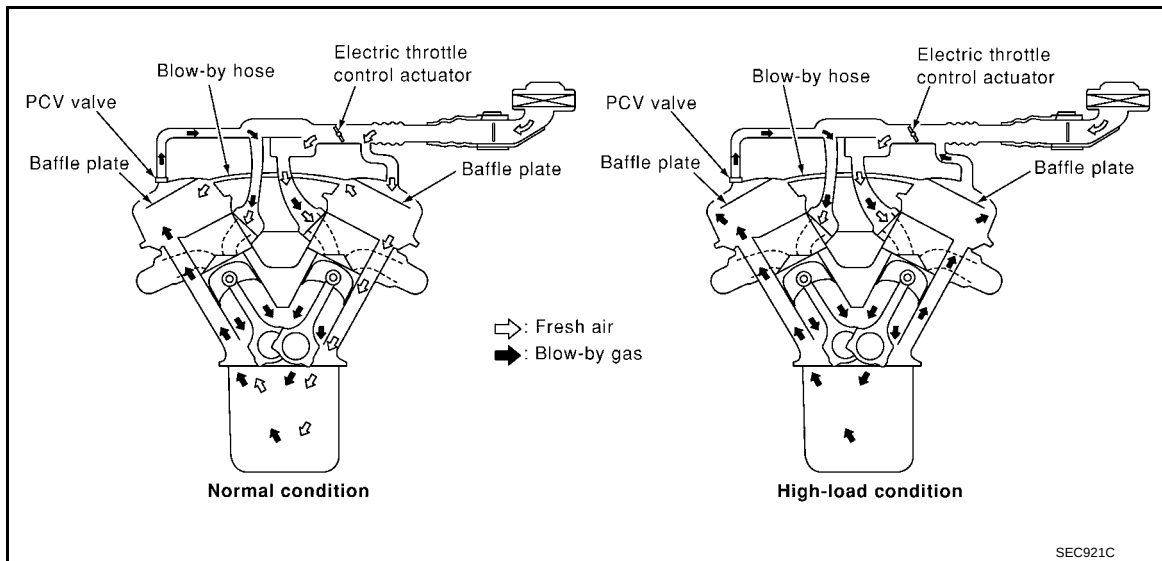
[VQ TYPE 2]

POSITIVE CRANKCASE VENTILATION

Description

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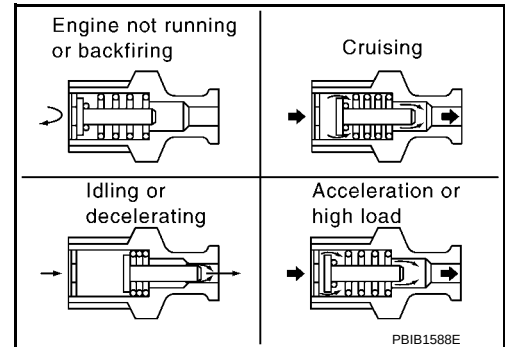
SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

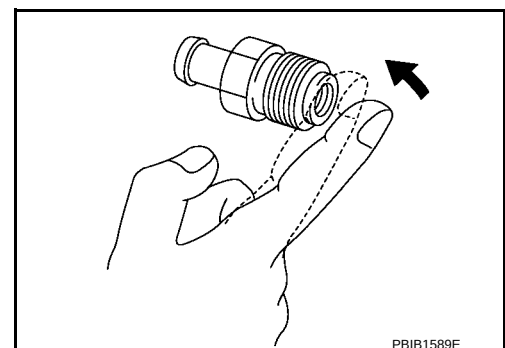


Component Inspection

INFOID:000000005448656

PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



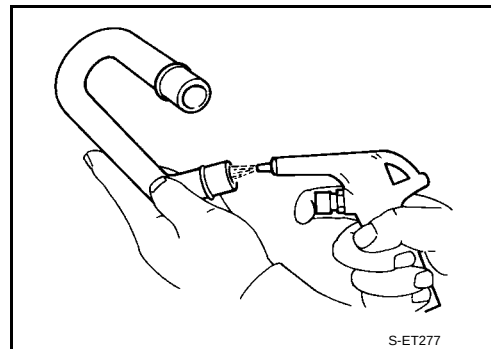
POSITIVE CRANKCASE VENTILATION

[VQ TYPE 2]

< SERVICE INFORMATION >

PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



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NATS (NISSAN ANTI-THEFT SYSTEM)

Description

INFOID:000000005448657

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT using NATS program card. Refer to [BL-70](#).
- Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT.
- When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT using NATS program card.
Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT Operation Manual, NATS.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:000000005448658

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	
Diagnostic Trouble Code (DTC)	
Freeze Frame data	
1st Trip Diagnostic Trouble Code (1st Trip DTC)	
1st Trip Freeze Frame data	

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT	×	×	×	×
ECM	×	×*	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to [EC-576. "Fail-Safe Chart"](#).)

Two Trip Detection Logic

INFOID:000000005448659

When a malfunction is detected for the 1st time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. When the ECM enters fail-safe mode (Refer to [EC-576. "Fail-Safe Chart"](#)), the DTC is stored in the ECM memory even in the 1st trip.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-Related Diagnostic Information

INFOID:000000005448660

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT screen terms)	DTC* ¹		Trip	MIL	Reference page
	CONSULT	ECM* ²			
CAN COMM CIRCUIT	U1000	1000* ³	2	—	EC-629
CAN COMM CIRCUIT	U1001	1001* ³	2	—	EC-629
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	—
INT/V TIM CONT-B1	P0011	0011	2	—	EC-631
INT/V TIM CONT-B2	P0021	0021	2	—	EC-631

ON BOARD DIAGNOSTIC (OBD) SYSTEM

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Items (CONSULT screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT	ECM*2			
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-636
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-636
ECT SEN/CIRC	P0117	0117	2	×	EC-643
ECT SEN/CIRC	P0118	0118	2	×	EC-643
TP SEN 2/CIRC	P0122	0122	1	×	EC-648
TP SEN 2/CIRC	P0123	0123	1	×	EC-648
TP SEN 1/CIRC	P0222	0222	1	×	EC-655
TP SEN 1/CIRC	P0223	0223	1	×	EC-655
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-662
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-662
KNOCK SEN/CIRC-B2	P0332	0332	2	—	EC-662
KNOCK SEN/CIRC-B2	P0333	0333	2	—	EC-662
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-667
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-673
CMP SEN/CIRC-B2	P0345	0345	2	×	EC-673
PW ST P SEN/CIRC	P0550	0550	2	—	EC-682
ECM	P0605	0605	1 or 2	× or —	EC-687
A/F SEN1 HTR (B1)	P1031	1031	2	×	EC-689
A/F SEN1 HTR (B1)	P1032	1032	2	×	EC-689
A/F SEN1 HTR (B2)	P1051	1051	2	×	EC-689
A/F SEN1 HTR (B2)	P1052	1052	2	×	EC-689
ECM BACK UP/CIRC	P1065	1065	2	×	EC-696
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-700
ETC ACTR	P1121	1121	1	×	EC-707
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-709
ETC MOT PWR	P1124	1124	1	×	EC-715
ETC MOT PWR	P1126	1126	1	×	EC-715
ETC MOT	P1128	1128	1	×	EC-720
INT/V TIM V/CIR-B2	P1136	1136	2	×	EC-700
ENG OVER TEMP	P1217	1217	1	×	EC-724
CTP LEARNING	P1225	1225	2	—	EC-733
CTP LEARNING	P1226	1226	2	—	EC-735
SENSOR POWER/CIRC	P1229	1229	1	×	EC-737
A/F SENSOR1 (B1)	P1271	1271	2	×	EC-744
A/F SENSOR1 (B1)	P1272	1272	2	×	EC-752
A/F SENSOR1 (B1)	P1276	1276	2	×	EC-760
A/F SENSOR1 (B2)	P1281	1281	2	×	EC-744
A/F SENSOR1 (B2)	P1282	1282	2	×	EC-752
A/F SENSOR1 (B2)	P1286	1286	2	×	EC-760
ASCD SW	P1564	1564	1	—	EC-768
ASCD BRAKE SW	P1572	1572	1	—	EC-774
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-552
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-786

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

Items (CONSULT screen terms)	DTC* ¹		Trip	MIL	Reference page
	CONSULT	ECM* ²			
IN PULY SPEED	P1715	1715	2	—	EC-791
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-792
APP SEN 1/CIRC	P2122	2122	1	×	EC-797
APP SEN 1/CIRC	P2123	2123	1	×	EC-797
APP SEN 2/CIRC	P2127	2127	1	×	EC-803
APP SEN 2/CIRC	P2128	2128	1	×	EC-803
TP SENSOR	P2135	2135	1	×	EC-810
APP SENSOR	P2138	2138	1	×	EC-817

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: The troubleshooting for this DTC need CONSULT.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For fail-safe items, the DTC is stored in the ECM memory even in the 1st trip.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-570, "Trouble Diagnosis Introduction"](#). Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT

CONSULT Examples: P0117, P0340, P1065, etc.

(CONSULT also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0340, 1065, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify malfunction status as shown below. Therefore, using CONSULT (if available) is recommended.**

A sample of CONSULT display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VQ TYPE 2]

< SERVICE INFORMATION >

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT. For details, see [EC-600, "CONSULT Function \(ENGINE\)"](#).

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

WITH CONSULT

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. The emission related diagnostic information in the ECM can be erased by selecting "All Erase" in the "Description" of "FAINAL CHECK" mode with CONSULT.

WITHOUT CONSULT

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
 2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
 3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.
- Refer to [EC-556, "Malfunction Indicator Lamp \(MIL\)"](#).

• If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.

• The following data are cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

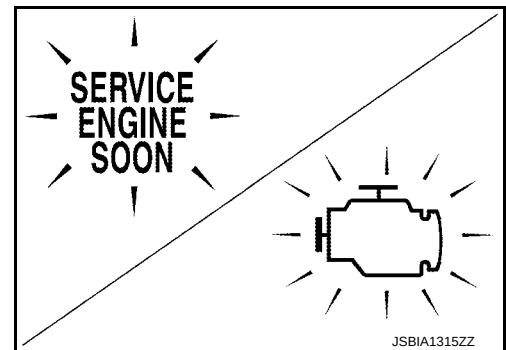
Malfunction Indicator Lamp (MIL)

INFOID:000000005448661

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
If the MIL does not light up, refer to [DI-28](#), or see [EC-907](#).
2. When the engine is started, the MIL should go off.
If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. One trip detection diagnoses will light up the MIL in the 1st trip.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

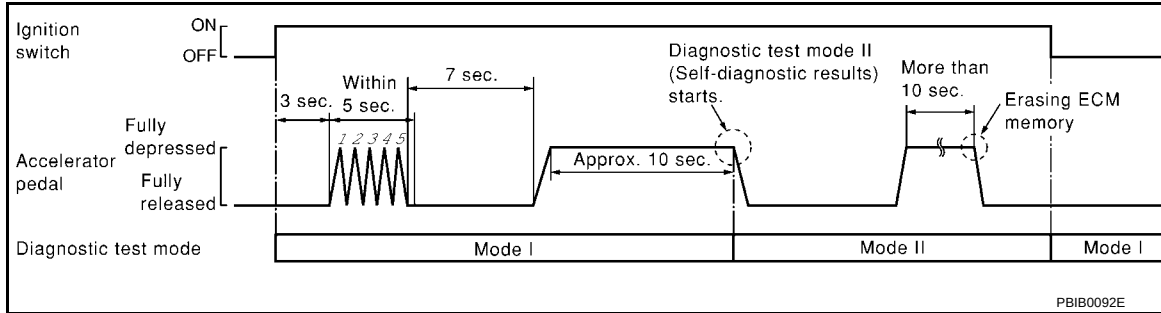
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

[VQ TYPE 2]

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [DI-28](#) or see [EC-907](#).

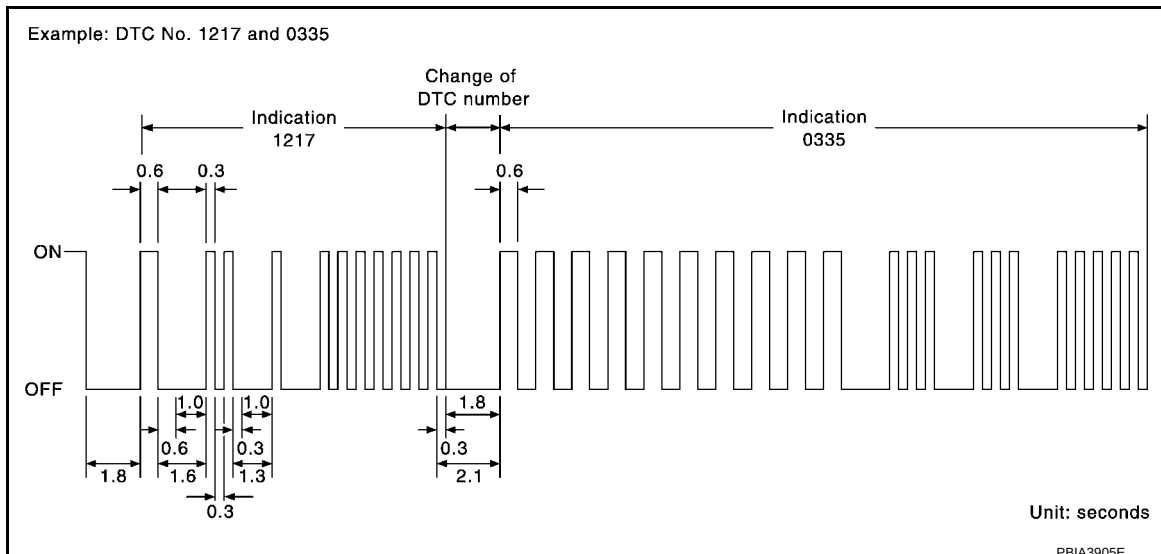
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

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[VQ TYPE 2]

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-528](#))

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

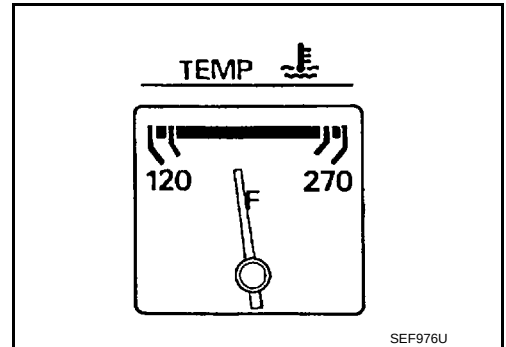
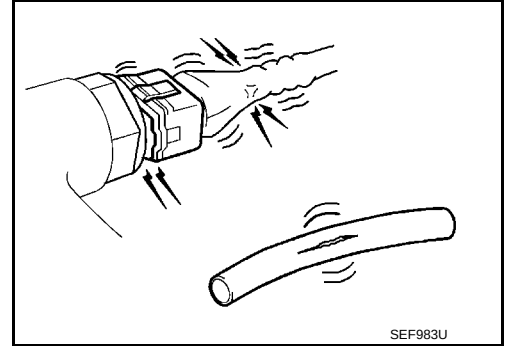
BASIC SERVICE PROCEDURE

Basic Inspection

INFOID:000000005448662

1.INSPECTION START

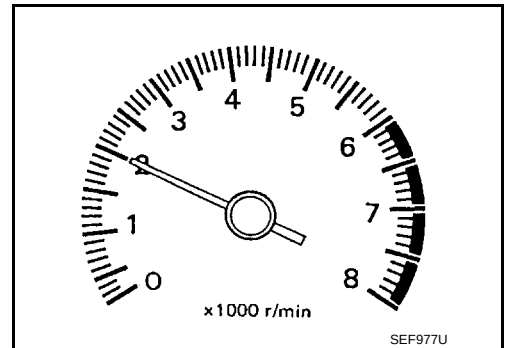
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses for splits, kinks and improper connections
 - Hoses and ducts for leaks
 - Air cleaner clogging
 - Gasket
3. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Rear window defogger switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT.

OK or NG

- OK >> GO TO 3.
 NG >> GO TO 2.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3.CHECK TARGET IDLE SPEED

With CONSULT

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

BASIC SERVICE PROCEDURE

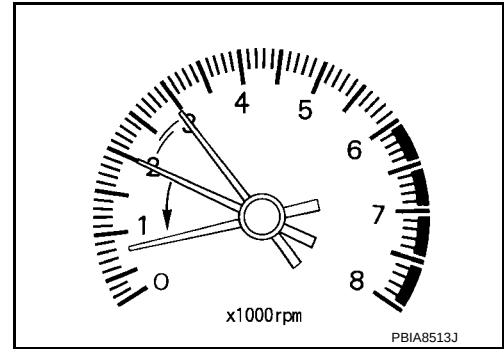
[VQ TYPE 2]

< SERVICE INFORMATION >

- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)



Without CONSULT

- Run engine at about 2,000 rpm for about 2 minutes under no load.
- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed. Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.

NG >> GO TO 4.

4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-566, "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-566, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.

- No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7.CHECK TARGET IDLE SPEED AGAIN

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)

Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.

NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-673](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-667](#).

OK or NG

OK >> GO TO 9.

NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

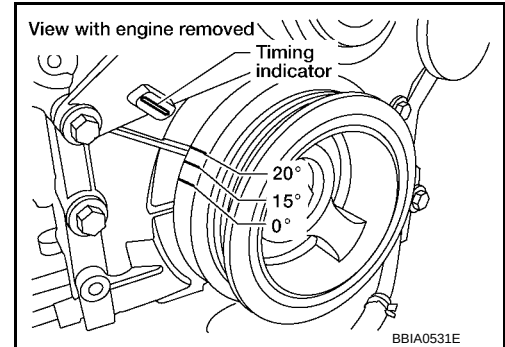
M/T: 15 ± 5° BTDC (in Neutral position)

A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-566, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-566, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.

No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

[VQ TYPE 2]

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT.
Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

M/T: 625 ± 50 rpm (in Neutral position)

A/T: 625 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 15.

NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to [EC-564, "Idle Speed and Ignition Timing Check"](#).

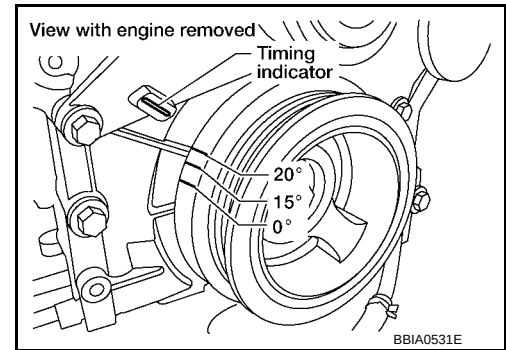
M/T: 15 ± 5° BTDC (in Neutral position)

A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-53](#).

OK or NG

OK >> GO TO 17.

- NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-673](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-667](#).

OK or NG

OK >> GO TO 18.

- NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).

>> GO TO 4.

Idle Speed and Ignition Timing Check

IDLE SPEED

① With CONSULT

Check idle speed in "DATA MONITOR" mode with CONSULT.

② Without CONSULT

Check idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire with installed between No.4 ignition coil and No.4 spark plug.

NOTE:

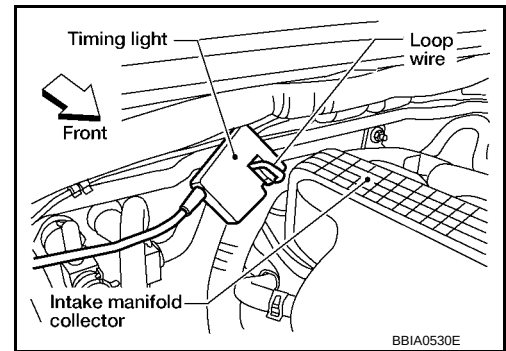
For the method of installing the tachometer, refer to "IGNITION TIMING".

IGNITION TIMING

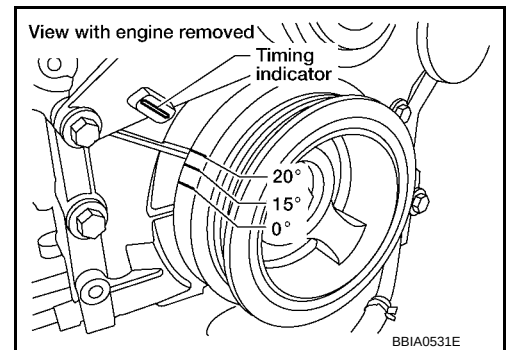
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire as shown.

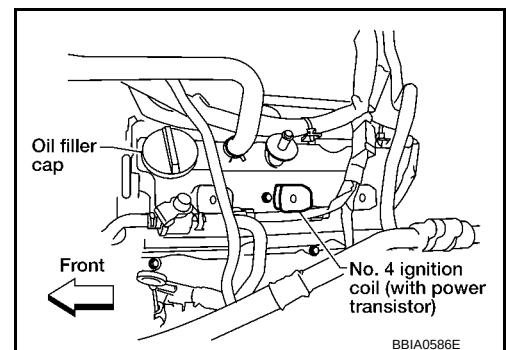


2. Check ignition timing.



Method B

1. Remove No. 4 ignition coil.

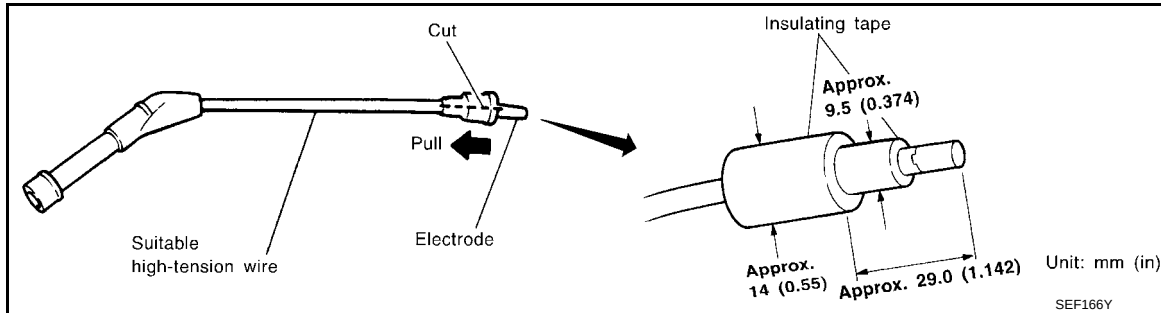
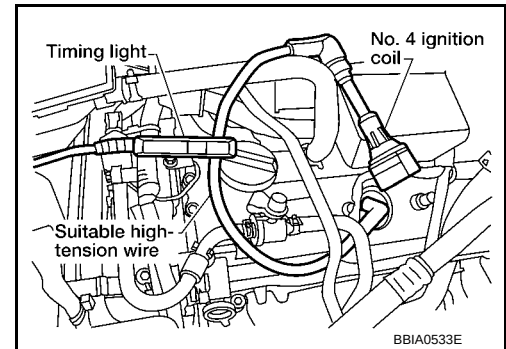


BASIC SERVICE PROCEDURE

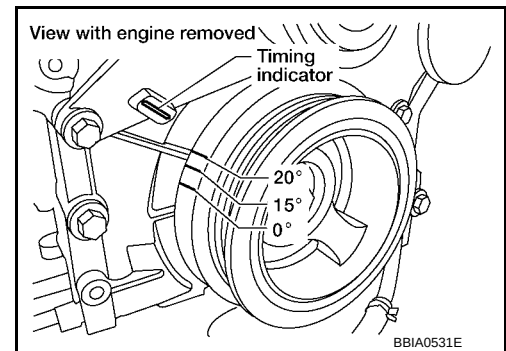
[VQ TYPE 2]

< SERVICE INFORMATION >

2. Connect No. 4 ignition coil and No. 4 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.



3. Check ignition timing.



Procedure After Replacing ECM

INFOID:000000005448664

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

Accelerator Pedal Released Position Learning

INFOID:000000005448665

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

INFOID:000000005448666

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

INFOID:000000005448667

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
 - A/T models
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- Without CONSULT: Drive vehicle for 10 minutes.
 - M/T models
- Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT

1. Perform [EC-565. "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-566. "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
6. Touch "START" and wait 20 seconds.
7. Make sure that "CMPLT" is displayed on CONSULT screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION

BASIC SERVICE PROCEDURE

[VQ TYPE 2]

< SERVICE INFORMATION >

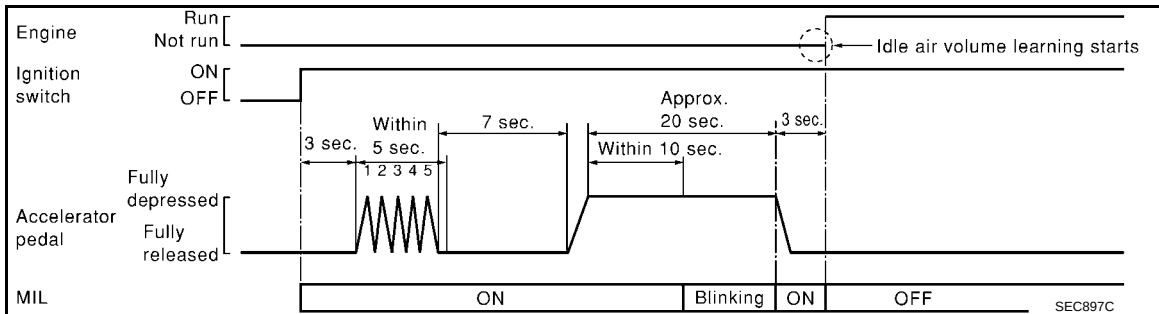
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

⊗ Without CONSULT

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

1. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, then turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.
11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. Check that throttle valve is fully closed.
2. Check PCV valve operation.
3. Check that downstream of throttle valve is free from air leakage.
4. When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform [EC-612](#).

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

[VQ TYPE 2]

5. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:
- Engine stalls.
 - Erroneous idle.

Fuel Pressure Check

INFOID:000000005448668

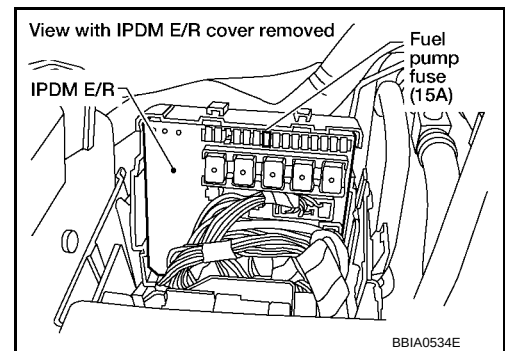
FUEL PRESSURE RELEASE

With CONSULT

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

Without CONSULT

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

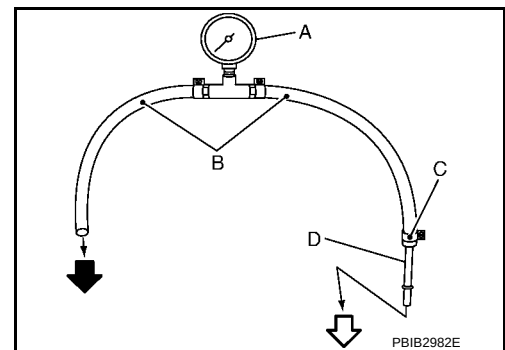
CAUTION:

- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because D40 models do not have fuel return system.

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
 -  To quick connector
 -  To fuel tube (engine side)
 - C: Clamp
 - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
 - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
 - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
 - Use Pressure Gauge to check fuel pressure.
3. Remove fuel hose. Refer to [EM-36](#).
 - Do not twist or kink fuel hose because it is plastic hose.

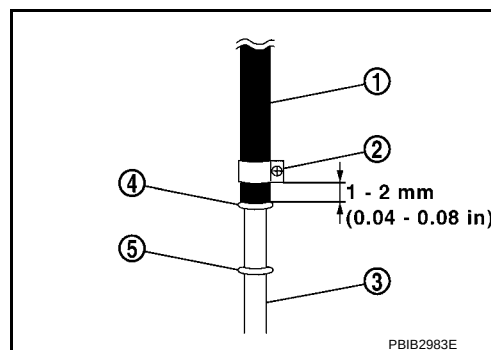


BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

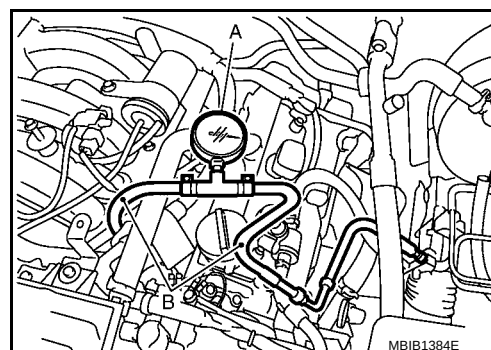
[VQ TYPE 2]

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
5. Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
 7. Turn ignition switch ON and check for fuel leakage.
 8. Start engine and check for fuel leakage.
 9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm², 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.
If NG, repair or replace.

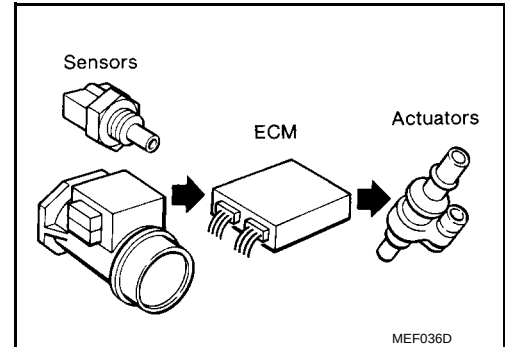
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

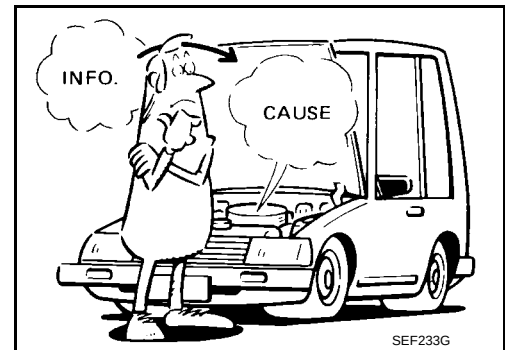
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INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



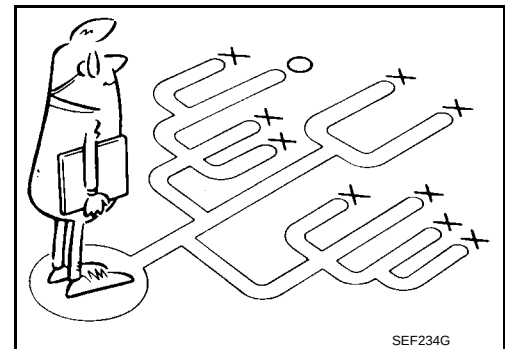
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT or a circuit tester connected should be performed. Follow the WORK FLOW on "WORK FLOW".

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



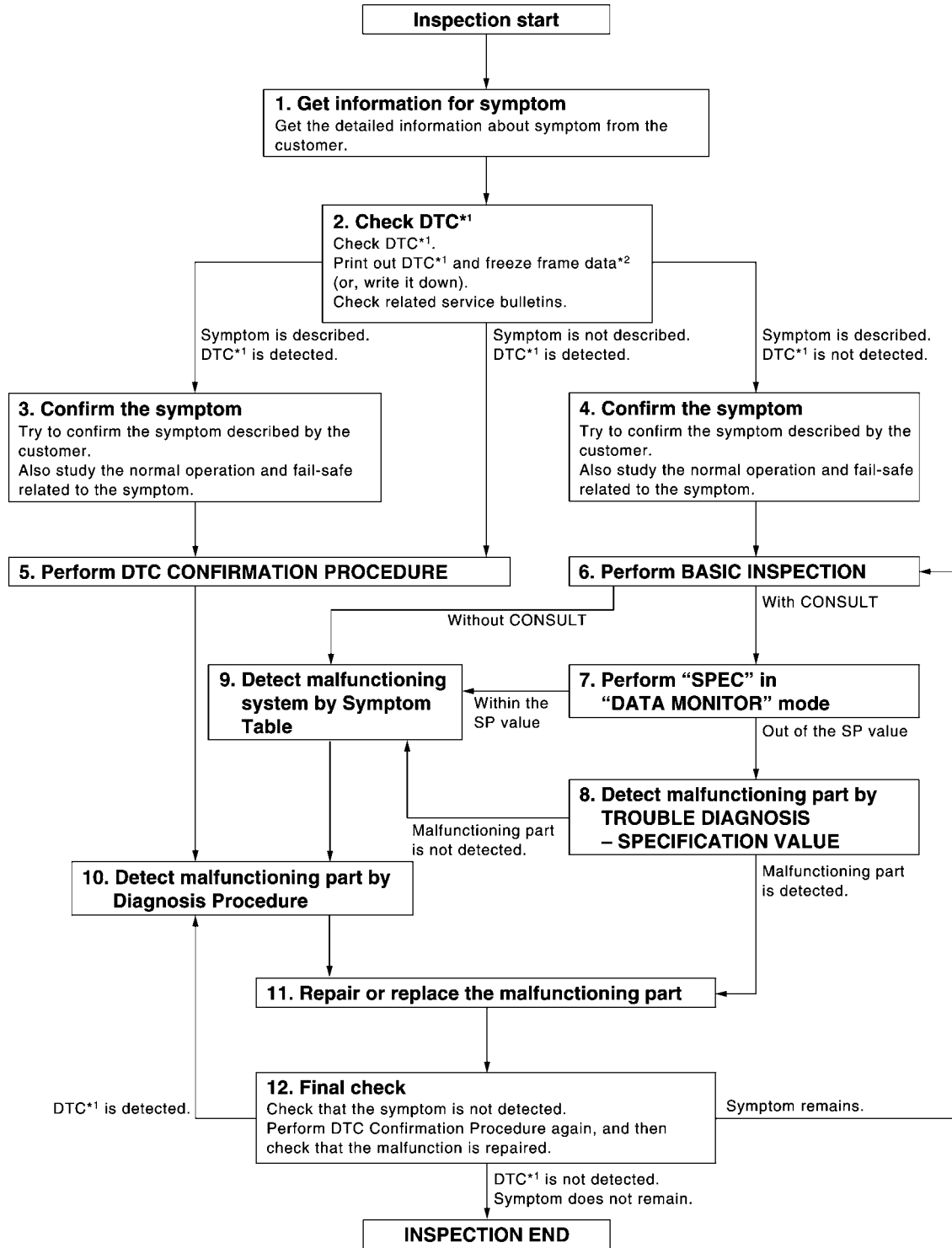
WORK FLOW

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Overall Sequence



*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

JSBIA1228GB

Detailed Flow

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "DIAGNOSTIC WORKSHEET".

>> GO TO 2.

< SERVICE INFORMATION >

2. CHECK DTC*¹

1. Check DTC*¹.
2. Perform the following procedure if DTC*¹ is displayed.
 - Record DTC*¹ and freeze frame data*². (Print them out with CONSULT.)
 - Erase DTC*¹. (Refer to [EC-553, "Emission-Related Diagnostic Information"](#).)
 - Study the relationship between the cause detected by DTC*¹ and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-577](#).)
3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*¹ is displayed>>GO TO 3.

Symptom is described, DTC*¹ is not displayed>>GO TO 4.

Symptom is not described, DTC*¹ is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*¹, and then make sure that DTC*¹ is detected again.

At this time, always connect CONSULT to the vehicle, and check diagnostic results in real time on "DATA MONITOR (AUTO TRIG)".

If two or more DTCs*¹ are detected, refer to [EC-575, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data*² is useful if the DTC*¹ is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*¹ cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC*¹ by DTC Confirmation Procedure.

Is DTC*¹ detected?

Yes >> GO TO 10.

No >> Check according to [EC-620](#).

6. PERFORM BASIC INSPECTION

Perform [EC-560, "Basic Inspection"](#).

With CONSULT>>GO TO 7.

Without CONSULT>>GO TO 9.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

7.PERFORM DATA MONITOR (SPEC) MODE

With CONSULT

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL", and "A/F ALPHA-B1", "A/F ALPHA-B2" are within the SP value using CONSULT "DATA MONITOR (SPEC)" mode. Refer to [EC-612, "Diagnosis Procedure"](#).

Are they within the SP value?

- Yes >> GO TO 9.
- No >> GO TO 8.

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC-612](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> GO TO 9.

9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to [EC-577, "Symptom Matrix Chart"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10.DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:

The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-607, "CONSULT Reference Value in Data Monitor Mode"](#), [EC-591, "ECM Terminal and Reference Value"](#).

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to [EC-553, "Emission-Related Diagnostic Information"](#).

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*¹ is detected)>>GO TO 10.

NG (Symptom remains)>>GO TO 6.

OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*¹ in ECM. (Refer to [EC-553, "Emission-Related Diagnostic Information"](#).)

2. INSPECTION END

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

SEF907L

[VQ TYPE 2]

Worksheet Sample

A
EC
C
D
E
F
G
H
I
J
K
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M
N
O
P

LEC031A

INFOID:0000000005448670

NOTE:

EC-575

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Priority	Detected items (DTC)
1	• U1000 U1001 CAN communication line • P0102 P0103 Mass air flow sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0345 Camshaft position sensor (PHASE) • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P1706 Park/Neutral position (PNP) signal • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0550 Power steering pressure sensor • P1031 P1032 P1051 P1052 Air fuel ratio (A/F) sensor 1 heater • P1065 ECM power supply • P1111 P1136 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 P1128 Electric throttle control actuator • P1217 Engine over temperature (OVERHEAT) • P1271 P1272 P1276 P1281 P1282 P1286 Air fuel ratio (A/F) sensor 1 • P1805 Brake switch
3	• P0011 P0021 Intake valve timing control • P1121 Electric throttle control actuator • P1564 ASCD steering switch • P1572 ASCD brake switch • P1715 Input speed sensor

Fail-Safe Chart

INFOID:000000005448671

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. (When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less. (When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
		Vehicle condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

INFOID:000000005448672

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-856
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-568
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-850
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-546
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-550
	Incorrect idle speed adjustment						1	1	1	1		1			EC-560
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-707 , EC-709
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-560
	Ignition circuit	1	1	2	2	2		2	2			2			EC-882

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Power supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-621
Mass air flow sensor circuit	1			2										EC-636
Engine coolant temperature sensor circuit														EC-643
Air fuel ratio (A/F) sensor		1	2	3	2		2	2			2			EC-744 , EC-752 , EC-760
Throttle position sensor circuit														EC-648 , EC-655 , EC-733 , EC-735 , EC-810
Accelerator pedal position sensor circuit			3	2	1				2					EC-737 , EC-797 , EC-803 , EC-817
Knock sensor circuit			2								3			EC-662
Crankshaft position sensor (POS) circuit	2	2												EC-667
Camshaft position sensor (PHASE) circuit	3	2												EC-673
Vehicle speed signal circuit		2	3		3						3			EC-906
Power steering pressure sensor circuit		2					3	3						EC-682
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-687 , EC-696
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-700
PNP signal circuit			3		3		3	3			3			EC-786
VIAS control solenoid valve circuit					1									EC-899
Refrigerant pressure sensor circuit		2				3			3		4			EC-894
Electrical load signal circuit							3							EC-837
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-155 , MTC-29
ABS actuator and electric unit (control unit)			4											BRC-10

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATSWATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-6
	Fuel piping			5	5	5		5	5			5			FL-4
	Vapor lock														—
	Valve deposit														—
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			—
Air	Air duct		5												EM-16
	Air cleaner														EM-16
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)			5		5		5	5			5			EM-16
	Electric throttle control actuator	5			5		5			5					EM-18
	Air leakage from intake manifold/Collector/Gasket														EM-18 , EM-21
Cranking	Battery	1	1	1		1		1	1					1	SC-4
	Generator circuit														SC-13
	Starter circuit	3										1			SC-35
	Signal plate	6													EM-104
	PNP signal	4													MT-13 , AT-117
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-88
	Cylinder head gasket									4			3		
	Cylinder block														
	Piston												4		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			EM-104
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														EM-53
	Camshaft														EM-71
	Intake valve timing control	5	5	5	5	5		5	5			5			EM-53
	Intake valve														
	Exhaust valve												3		EM-88

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-23 , EX-3
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-28 , LU-12 , LU-9 , LU-10
	Oil level (Low)/Filthy oil														LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5	5	5		4	5				CO-13
	Thermostat								5						CO-28
	Water pump														CO-23
	Water gallery														CO-30
	Cooling fan								5						CO-21
	Coolant level (Low)/Contaminat-ed coolant								5						CO-10
NATS (Nissan Anti-theft system)		1	1												EC-552 or BL-70

1 - 6: The numbers refer to the order of inspection.

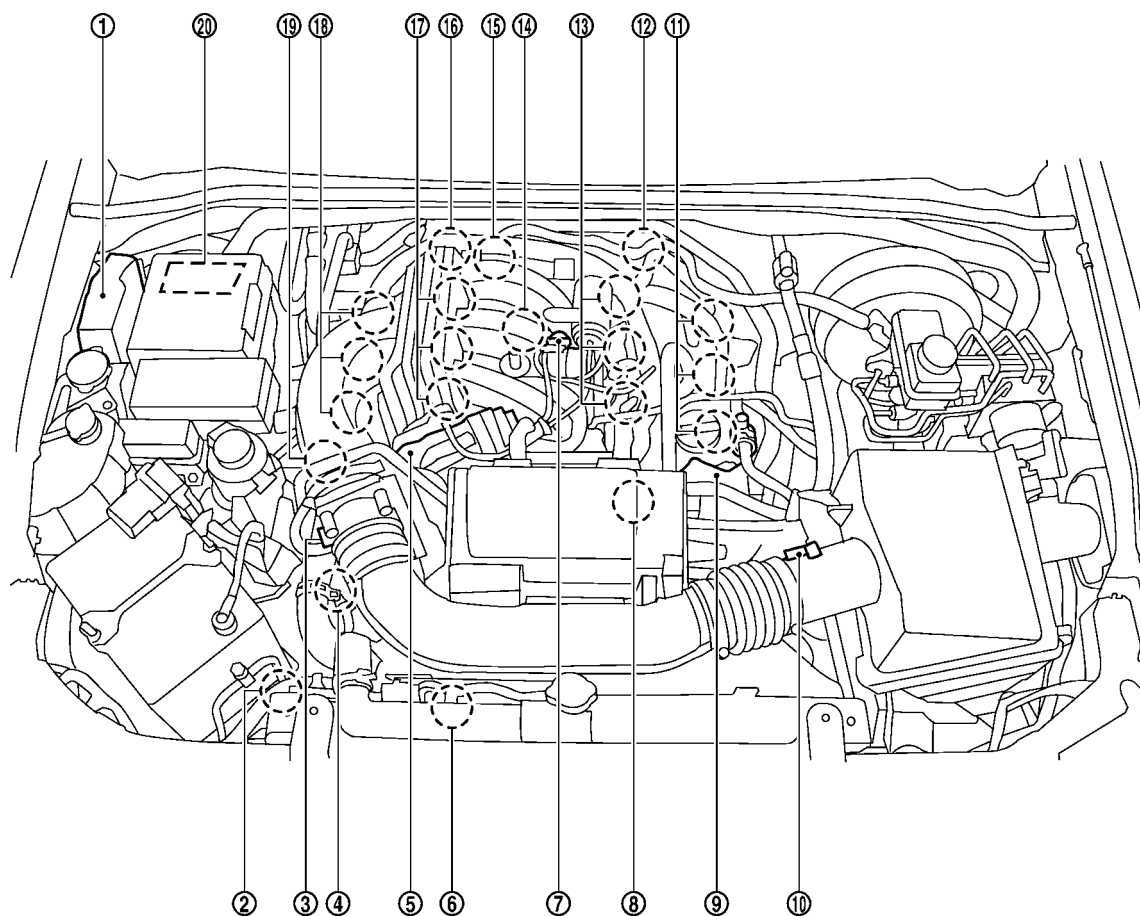
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Engine Control Component Parts Location

INFOID:000000005448673



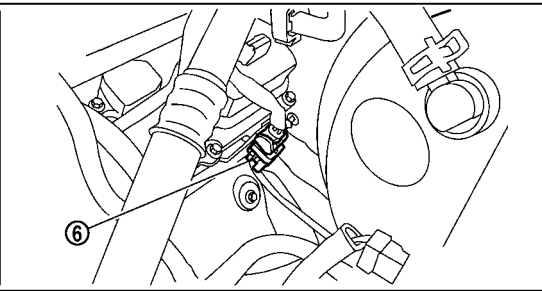
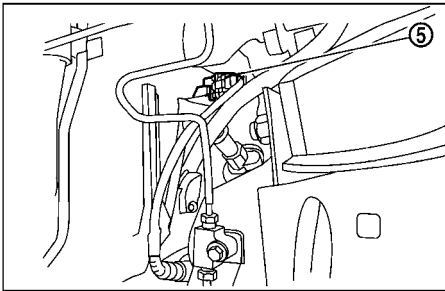
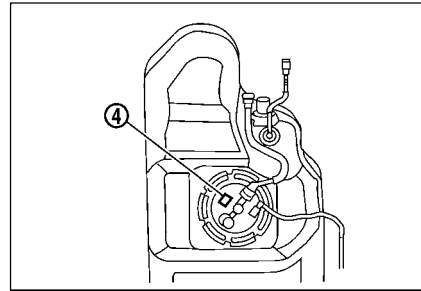
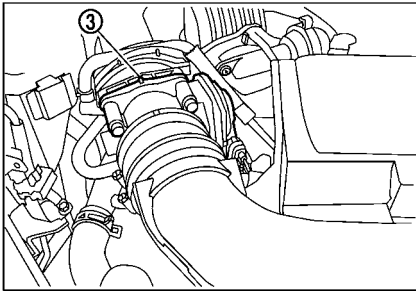
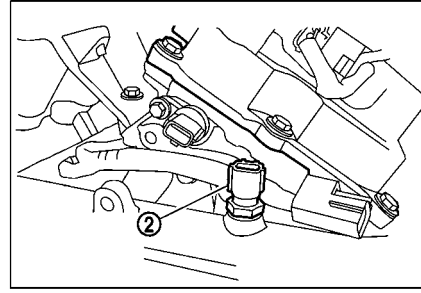
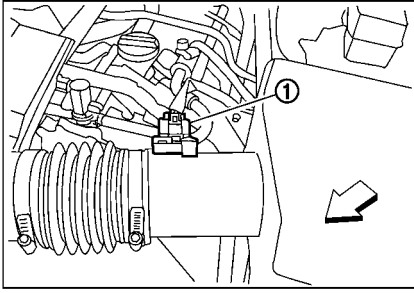
MB1B1270E

1. ECM	2. Refrigerant pressure sensor	3. Electric throttle control actuator
4. Power steering pressure sensor	5. Power valve actuator	6. Cooling fan motor
7. VIAS control solenoid valve	8. EVAP canister purge volume control solenoid valve	9. Intake valve timing control solenoid valve (bank 2)
10. Mass air flow sensor (with intake air temperature sensor)	11. Ignition coil (with power transistor) and spark plug (bank 2)	12. Camshaft position sensor (PHASE) (bank 2)
13. Fuel injector (bank 2)	14. Knock sensor	15. Camshaft position sensor (PHASE) (bank 1)
16. Engine coolant temperature sensor	17. Fuel injector (bank 1)	18. Ignition coil (with power transistor) and spark plug (bank 1)
19. Intake valve timing control solenoid valve (bank 1)	20. IPDM E/R	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]



MBIB1271E

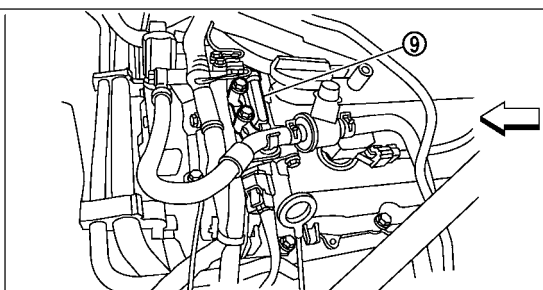
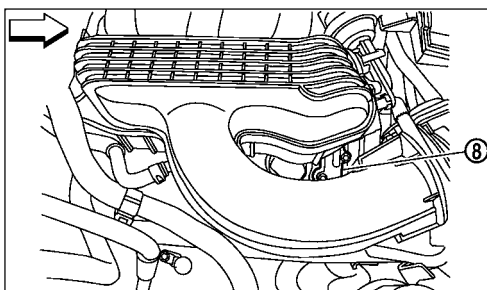
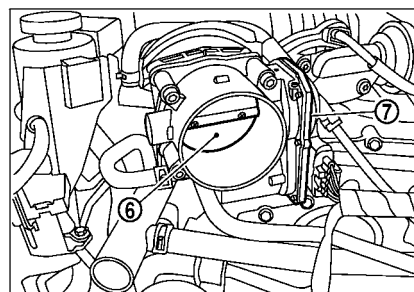
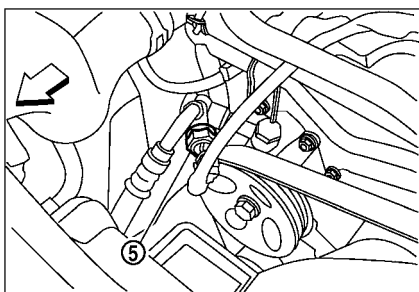
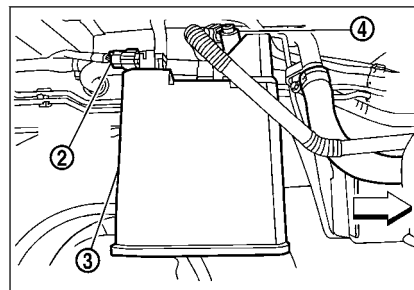
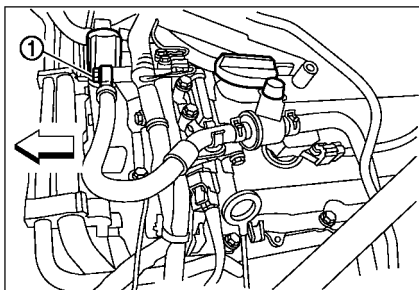
↩ : Vehicle front

1. Mass air flow sensor	2. Engine coolant temperature sensor	3. Electric throttle control actuator
4. Fuel level sensor unit and fuel pump harness connector	5. Air fuel ratio (A/F) sensor 1 (bank 1) harness connector	6. Air fuel ratio (A/F) sensor 1 (bank 2) harness connector

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]



MBIB1409E

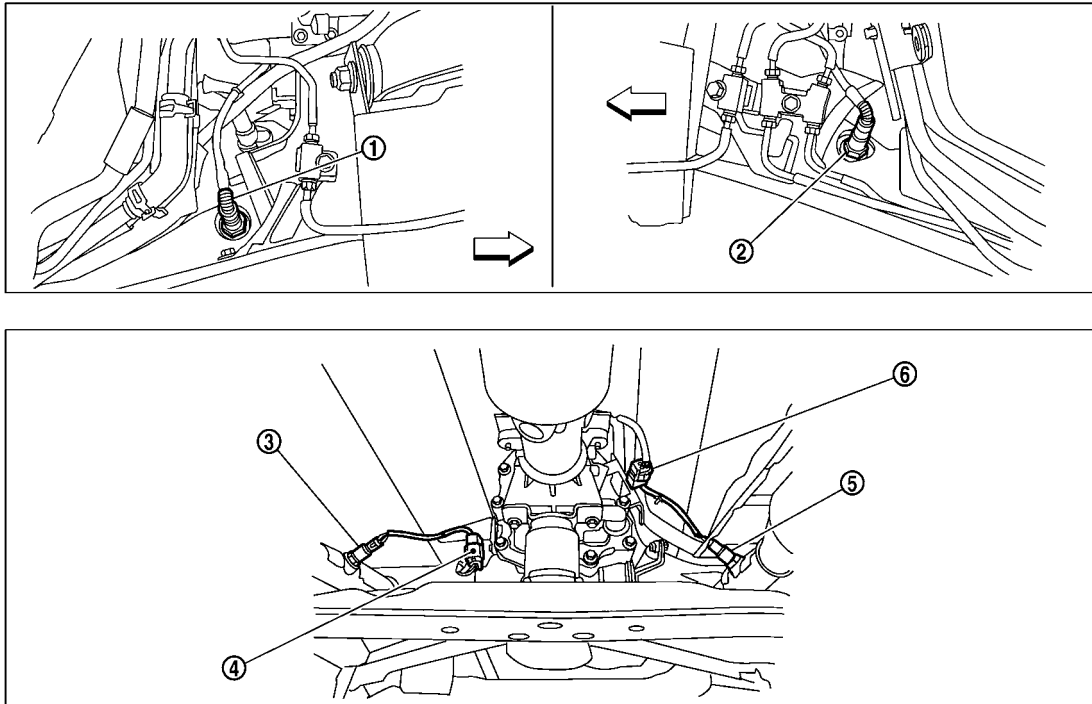
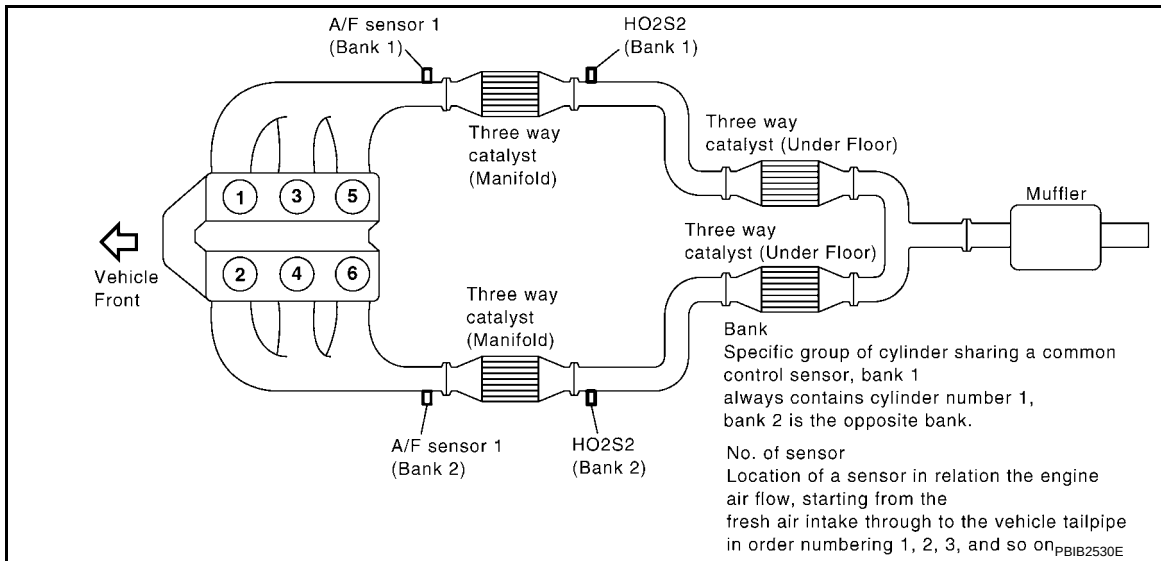
⇐ : Vehicle front

1. EVAP canister purge volume control solenoid valve	2. EVAP control system pressure sensor	3. EVAP canister
4. EVAP canister vent control valve	5. Power steering pressure sensor	6. Throttle valve
7. Electric throttle control actuator	8. Intake valve timing control solenoid valve (bank 1)	9. Intake valve timing control solenoid valve (bank 2)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]



MBIB1273E

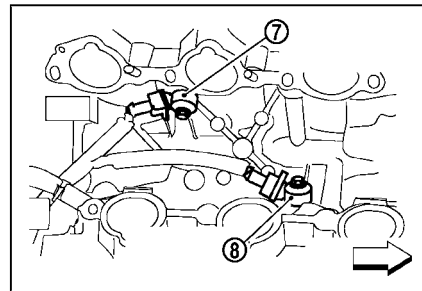
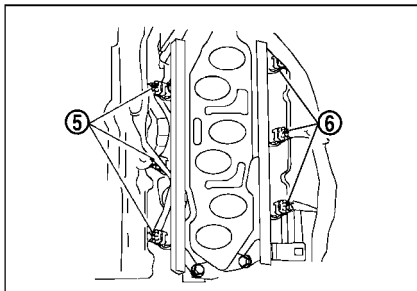
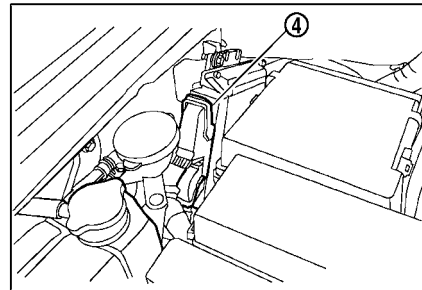
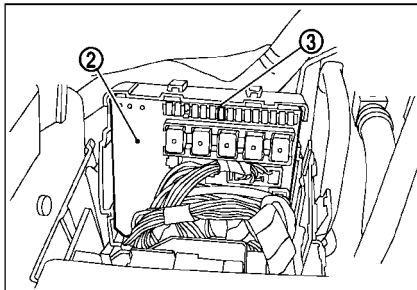
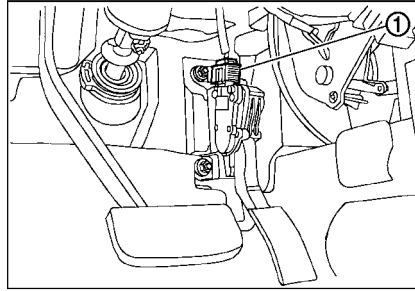
↩ : Vehicle front

1. Air fuel ratio (A/F) sensor 1 (bank 1)	2. Air fuel ratio (A/F) sensor 1 (bank 2)	3. Heated oxygen sensor 2 (bank 2)
4. Heated oxygen sensor 2 (bank 2) harness connector	5. Heated oxygen sensor 2 (bank 1)	6. Heated oxygen sensor 2 (bank 1) harness connector

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]



MB1B1274E

← : Vehicle front

1. Accelerator pedal position sensor harness connector	2. IPDM E/R	3. Fuel pump fuse (15A)
4. ECM harness connectors	5. Fuel injector (bank 1) harness connector	6. Fuel injector (bank 2) harness connector
7. Knock sensor (bank 2)	8. Knock sensor (bank 1)	

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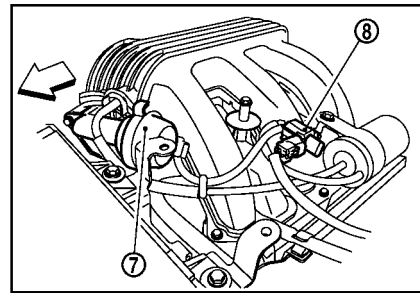
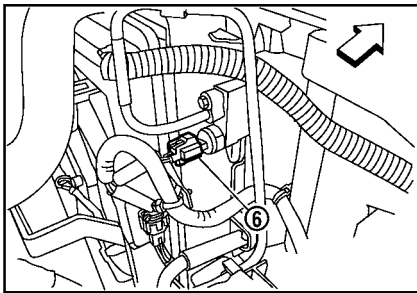
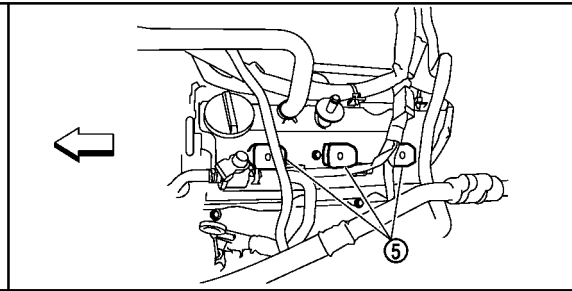
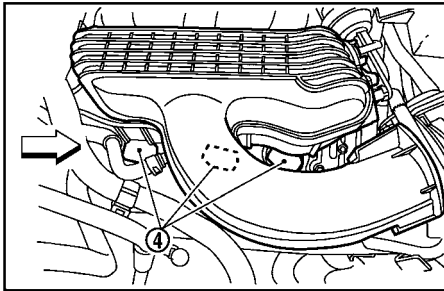
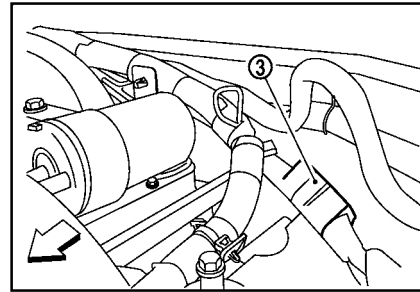
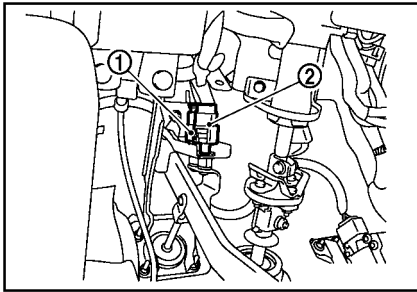
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TROUBLE DIAGNOSIS

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[VQ TYPE 2]



MBIB1275E

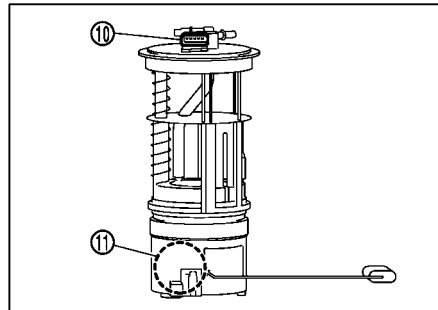
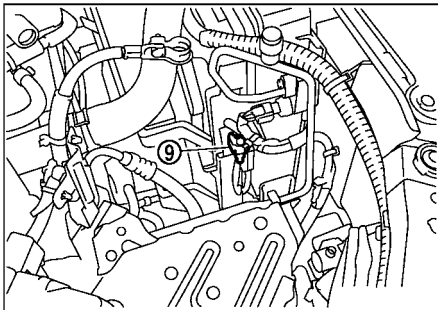
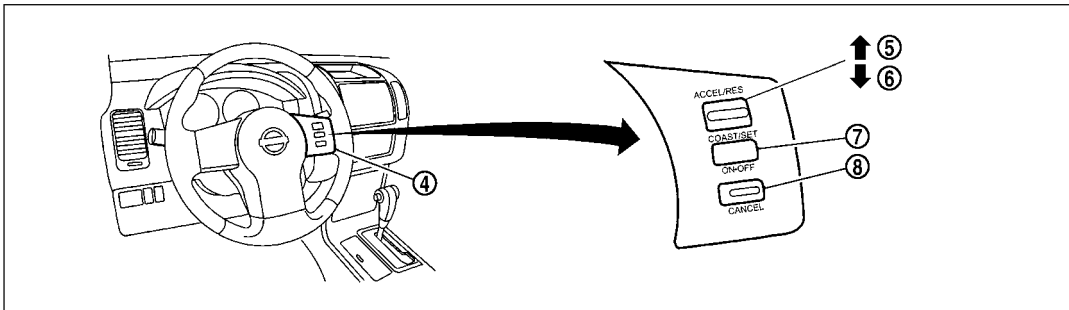
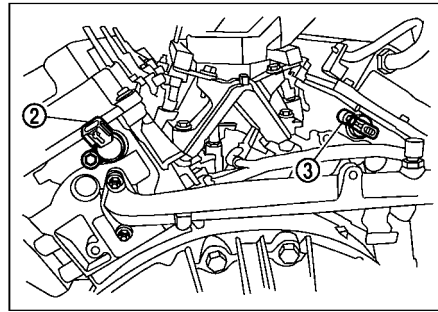
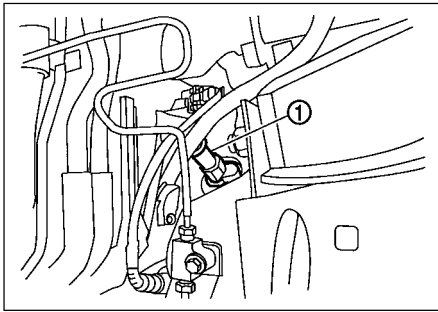
↩ : Vehicle front

1. ASCD brake switch	2. Stop lamp switch	3. Condenser-1
4. Ignition coil (with power transistor) (bank 1)	5. Ignition coil (with power transistor) (bank 2)	6. Refrigerant pressure sensor harness connector
7. Power valve actuator	8. VIAS control solenoid valve	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

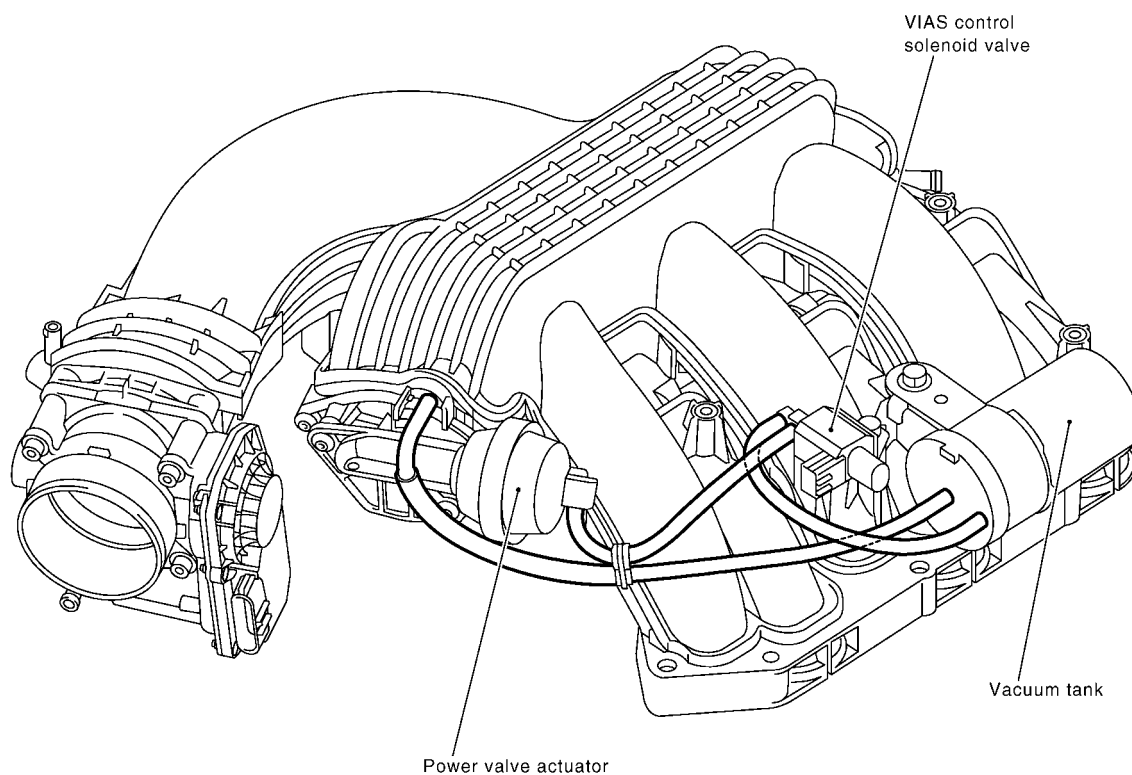


1. Crankshaft position sensor (POS)	2. Camshaft position sensor (PHASE) (bank 2)	3. Camshaft position sensor (PHASE) (bank 1)
4. ASCD steering switch	5. RESUME/ACCELERATE switch	6. SET/COAST switch
7. MAIN switch	8. CANCEL switch	9. Cooling fan control motor harness connector
10. Fuel level sensor unit and fuel pump	11. Fuel pressure regulator	

MBIB1276E

Vacuum Hose Drawing

INFOID:000000005448674



NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

Refer to [EC-537, "Schematic"](#) for Vacuum Control System.

PBIB2529E

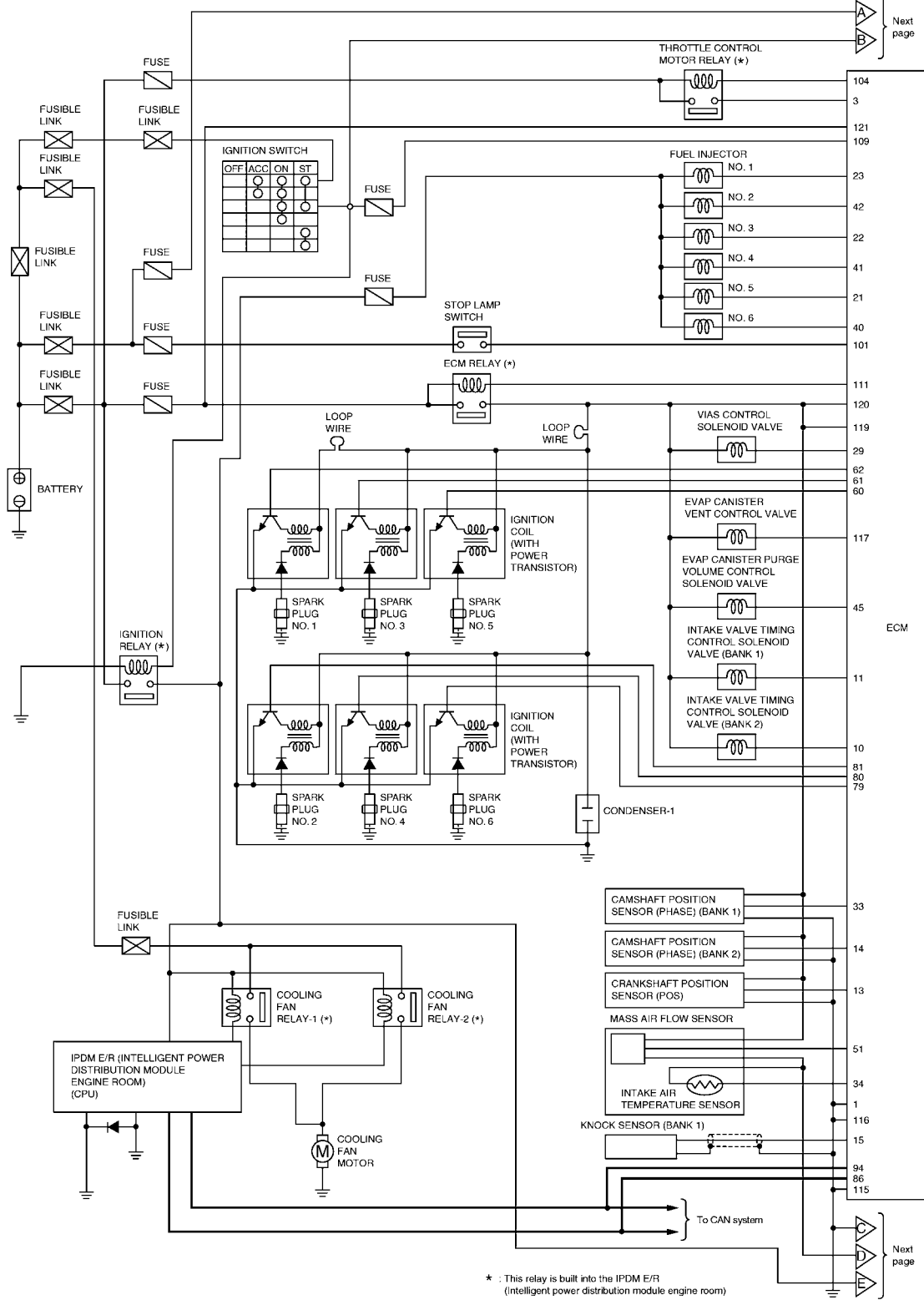
TROUBLE DIAGNOSIS

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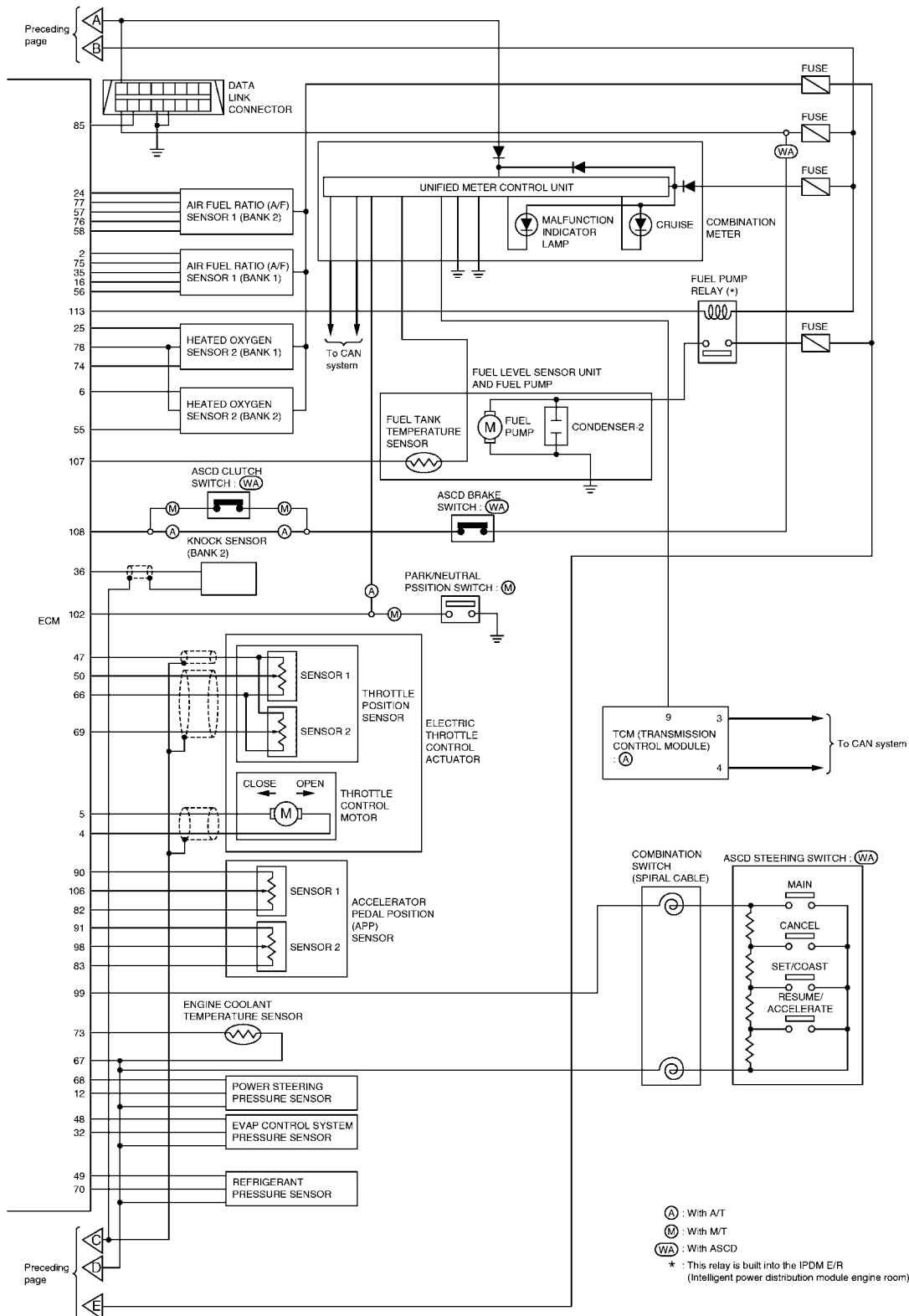
[VQ TYPE 2]

Circuit Diagram

INFOID:000000005448675



JMBWA0415GB



JMBWA0492GB

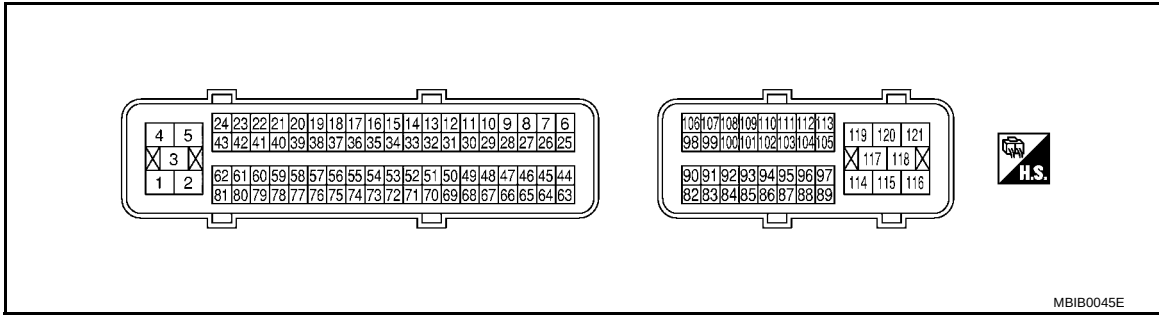
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< SERVICE INFORMATION >

[VQ TYPE 2]

ECM Harness Connector Terminal Layout

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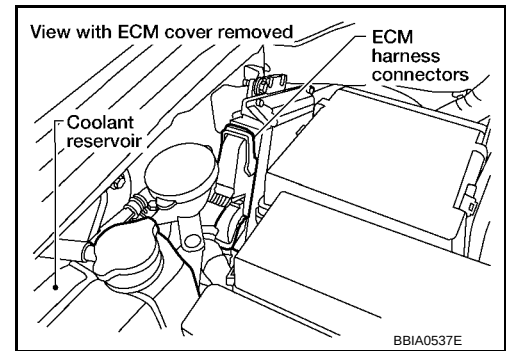


ECM Terminal and Reference Value

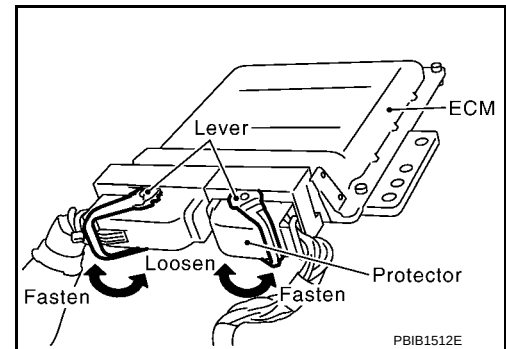
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PREPARATION

1. ECM located in the engine room passenger side behind reservoir tank.
2. Remove ECM harness connector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
 - Use extreme care not to touch 2 pins at one time.
 - Data is for comparison and may not be exact.



ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

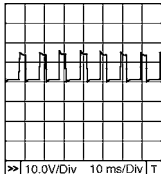
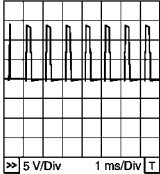
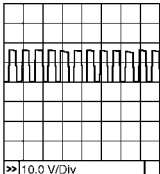
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

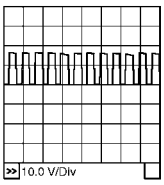
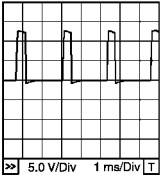
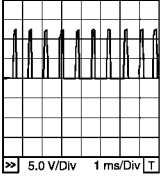
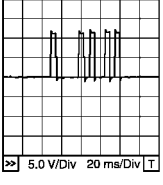
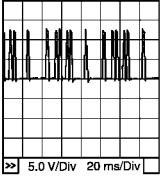
[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] • Idle speed	Body ground
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] • Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
10	W	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
12	P	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
13	G	Crankshaft position sensor (POS)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
14	Y	Camshaft position sensor (PHASE) (Bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
15	W	Knock sensor (Bank 1)	[Engine is running] • Idle speed	Approximately 2.5V

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N

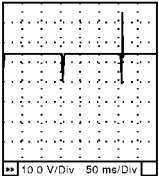
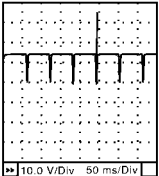
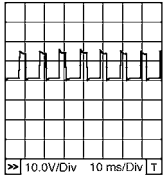
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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

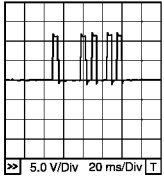
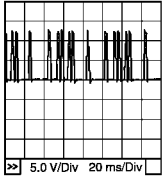
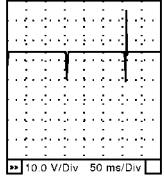
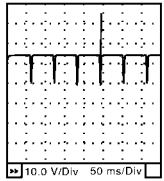
[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V
21	W	Fuel injector No. 5	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★ 
22	LG	Fuel injector No. 3		
23	SB	Fuel injector No. 1		BATTERY VOLTAGE (11 - 14V)★ 
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★ 
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] • Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
29	GR	VIAS control solenoid valve	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
32	W	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

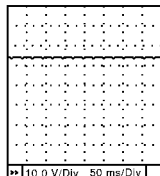
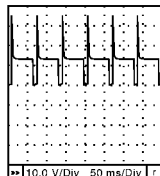
[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
34	BR	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
36	W	Knock sensor (Bank 2)	[Engine is running] • Idle speed	Approximately 2.5V
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

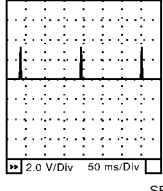
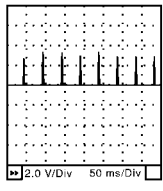
[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  10.0 V/Div 50 ms/Div SEC990C
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  10.0 V/Div 50 ms/Div SEC991C
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] - Engine: Stopped - Shift lever: D (A/T), 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine: Stopped - Shift lever: D (A/T), 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
51	P	Mass air flow sensor	[Ignition switch: ON]	Approximately 0.4V
			[Engine is running] Warm-up condition - Idle speed	0.9 - 1.2V
			[Engine is running] Warm-up condition - Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

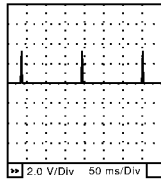
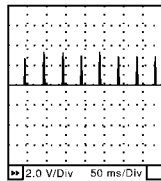
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
70	BR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
73	Y	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★ 
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
85	SB	Data link connector	[Ignition switch: ON] • CONSULT: Disconnected	Approximately 5V - Battery voltage (11 - 14V)
86	P	CAN communication line	[Ignition switch: ON]	Approximately 1.1 - 2.3V Output voltage varies with the communication status.
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
94	L	CAN communication line	[Ignition switch: ON]	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
99	SB	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V	EC
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)	
102	G (A/T) O (M/T)	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V	C
			[Ignition switch: ON] • Except above position	BATTERY VOLTAGE (11 - 14V)	D
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)	E
			[Ignition switch: ON]	0 - 1.0V	
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V	F
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V	G
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V	H
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)	I
109	R	Ignition switch	[Ignition switch: OFF]	0V	J
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V	K
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)	L
113	V	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5V	M
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)	N
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground	O
117	G	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	P
121	V	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)	

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

TROUBLE DIAGNOSIS

[VQ TYPE 2]

< SERVICE INFORMATION >

CONSULT Function (ENGINE)

INFOID:000000005448678

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. • CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-553, "Emission-Related Diagnostic Information"](#).

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to EC-528.)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Freeze frame data item*	Description
FUEL SYS-B1	“Fuel injection system status” at the moment a malfunction is detected is displayed. - One mode in the following is displayed.
FUEL SYS-B2	“Mode2”: Open loop due to detected system malfunction “Mode3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “Mode4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “Mode5”: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	“Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	“Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	- Accuracy becomes poor if engine speed drops below the idle rpm. - If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	The signal voltage of the mass air flow sensor is displayed.	When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	- When the engine is stopped, a certain value is indicated. - This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		
COOLANT TEMP/S [°C] or [°F]	×	×	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1) [V]	×	×	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
A/F SEN1 (B2) [V]	×			
HO2S2 (B1) [V]	×		The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	×			

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
HO2S2 MNTR (B1) [RICH/LEAN]	×		Display of heated oxygen sensor 2 signal: RICH: Means the amount of oxygen after three way catalyst is relatively small. LEAN: Means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT [V]	×	×	The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	The accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	The throttle position sensor signal voltage is displayed.	THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
INT/A TEMP SE [°C] or [°F]	×	×	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL [ON/OFF]	×	×	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL [ON/OFF]	×	×	[ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW [ON/OFF]	×		Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BT-DC]		×	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
PURG VOL C/V [%]			- Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. - The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			- The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. - The advance angle becomes larger as the value increases.	
INT/V SOL (B2) [%]				
VIAS S/V [ON/OFF]			- The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. - ON: VIAS control solenoid valve is operating. - OFF: VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]		×	- The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. - HI: High speed operation - LOW: Low speed operation - OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]			Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
I/P PULLY SPD [rpm]			Indicates the engine speed computed from the input speed signal.	
VEHICLE SPEED [km/h] or [MPH]			Indicates the vehicle speed computed from the output shaft revolution signal.	
IDL A/V LEARN [YET/CMPLT]			- Display the condition of idle air volume learning - YET: Idle Air Volume Learning has not been performed yet. - CMPLT: Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			Distance traveled while MIL is activated.	
A/F S1 HTR (B1) [%]			- Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. - The current flow to the heater becomes larger as the value increases.	
A/F S1 HTR (B2) [%]				

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
AC PRESS SEN [V]			The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW [ON/OFF]			Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1 [ON/OFF]			Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2 [ON/OFF]			Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL [ON/OFF]			Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
CRUISE LAMP [ON/OFF]			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			Voltage, frequency, duty cycle or pulse width measured by the probe.	- Only # is displayed if item is unable to be measured. - Figures with #s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				
HO2 S2 DIAG2 (B1)*			Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
HO2 S2 DIAG2 (B2)*			- Indicates DTC P0159 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B1)*			- Indicates DTC P0133 self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B2)*			- Indicates DTC P0153 self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	

*: The item is indicated, but not used.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
ENG SPEED [rpm]	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	The signal voltage of the mass air flow sensor specification is displayed.	When engine is running specification range is indicated.
B/FUEL SCHDL [msec]		×	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated.
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	- When engine is running specification range is indicated. - This data also includes the data for the air-fuel ratio learning control.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	- Engine: Return to the original trouble condition - Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel injector - Air fuel ratio (A/F) sensor 1
IGNITION TIMING	- Engine: Return to the original trouble condition - Timing light: Set - Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.

TROUBLE DIAGNOSIS

[VQ TYPE 2]

< SERVICE INFORMATION >

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BAL- ANCE	- Engine: After warming up, idle the engine. - A/C switch: OFF - Shift lever: P or N (A/T), Neutral (M/T) - Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or dies.	- Harness and connectors - Compression - Fuel injector - Power transistor - Spark plug - Ignition coil
COOLING FAN*	- Ignition switch: ON - Turn the cooling fan HI, LOW and OFF using CONSULT.	Cooling fan moves and stops.	- Harness and connectors - Cooling fan motor - IPDM E/R
ENG COOLANT TEMP	- Engine: Return to the original trouble condition - Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector
FUEL PUMP RE- LAY	- Ignition switch: ON (Engine stopped) - Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	- Harness and connectors - Fuel pump relay
VIAS SOL VALVE	- Ignition switch: ON - Turn solenoid valve ON and OFF with CONSULT and listen for operating sound.	Solenoid valve makes an operating sound.	- Harness and connectors - Solenoid valve
PURG VOL CONT/V	- Engine: After warming up, run engine at 1,500 rpm. - Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	- Harness and connectors - Solenoid valve
V/T ASSIGN AN- GLE	- Engine: Return to the original trouble condition - Change intake valve timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1. "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.

At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT OPERATION MANUAL.

2. "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

Operation

1. "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

- While narrowing down the possible causes, CONSULT should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "INCIDENT SIMULATION TESTS" in [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident".](#))

2. "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448679

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
* Specification data may not be directly related to their components signals/values/operations.
i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-612 .		
B/FUEL SCHDL	See EC-612 .		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-612 .		
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1) HO2S2 (B2)	- Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	- Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ↔ RICH
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1 ACCEL SEN 2*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRTL SEN 1 THRTL SEN 2*	Ignition switch: ON (Engine stopped) Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned.	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd	ON
		Rear window defogger switch and lighting switch is OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	13 - 18° BTDC
		2,000 rpm	25 - 45° BTDC
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	-5 - 5°C
		2,000 rpm	Approx. 0 - 30°C
INT/V SOL (B1) INT/V SOL (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%
VIAS S/V	Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	- For 1 second after turning ignition switch ON - Engine running or cranking		ON
	Except above conditions		OFF
THRTL RELAY	Ignition switch: ON		ON
COOLING FAN	- Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed is below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the speedometer indication
VEHICLE SPEED	Turn drive wheels and compare the CONSULT value with speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1) A/F S1 HTR (B2)	Engine: After warming up, idle the engine		0 - 100%
AC PRESS SEN	- Engine: Idle - Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	Turn drive wheels and compare speedometer indication with the CONSULT value.		Almost the same speed as the CONSULT value
SET VHCL SPD	Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	Ignition switch: ON	MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	- MAIN switch: ON - When vehicle speed is between 40km/h (25MPH) and 175km/h (109MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
HO2 S2 DIAG2 (B1)	This item is displayed but is not applicable to this model.		
HO2 S2 DIAG2 (B2)	This item is displayed but is not applicable to this model.		
A/F SEN1 DIAG2 (B1)	This item is displayed but is not applicable to this model.		
A/F SEN1 DIAG2 (B2)	This item is displayed but is not applicable to this model.		

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]

Major Sensor Reference Graph in Data Monitor Mode

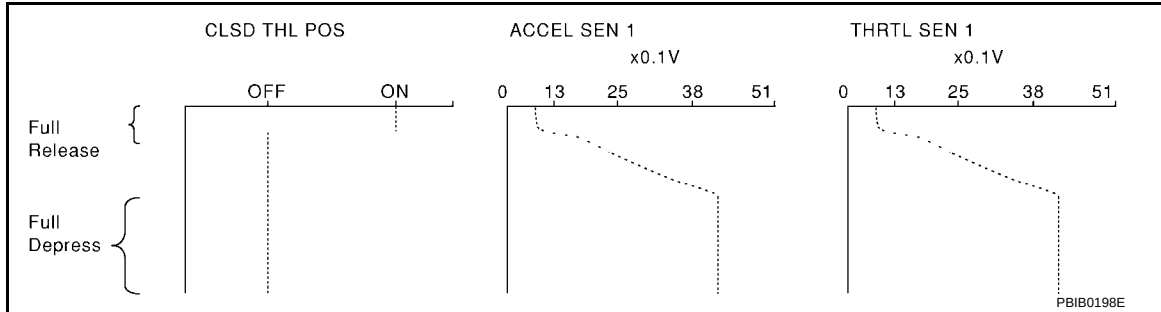
INFOID:000000005448680

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

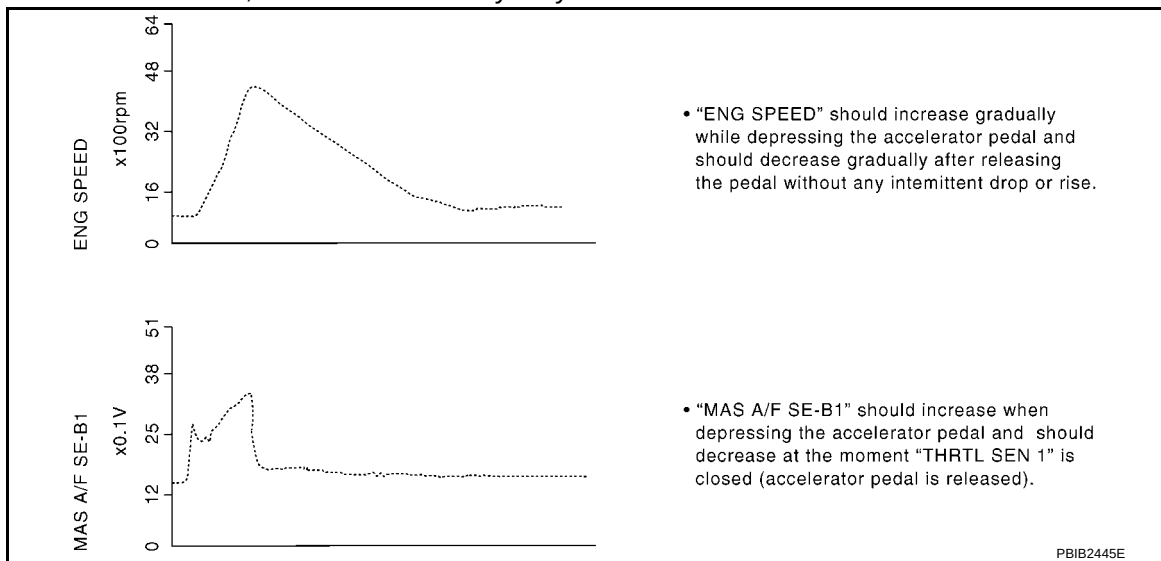
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T), 1st position (M/T).

The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.



ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

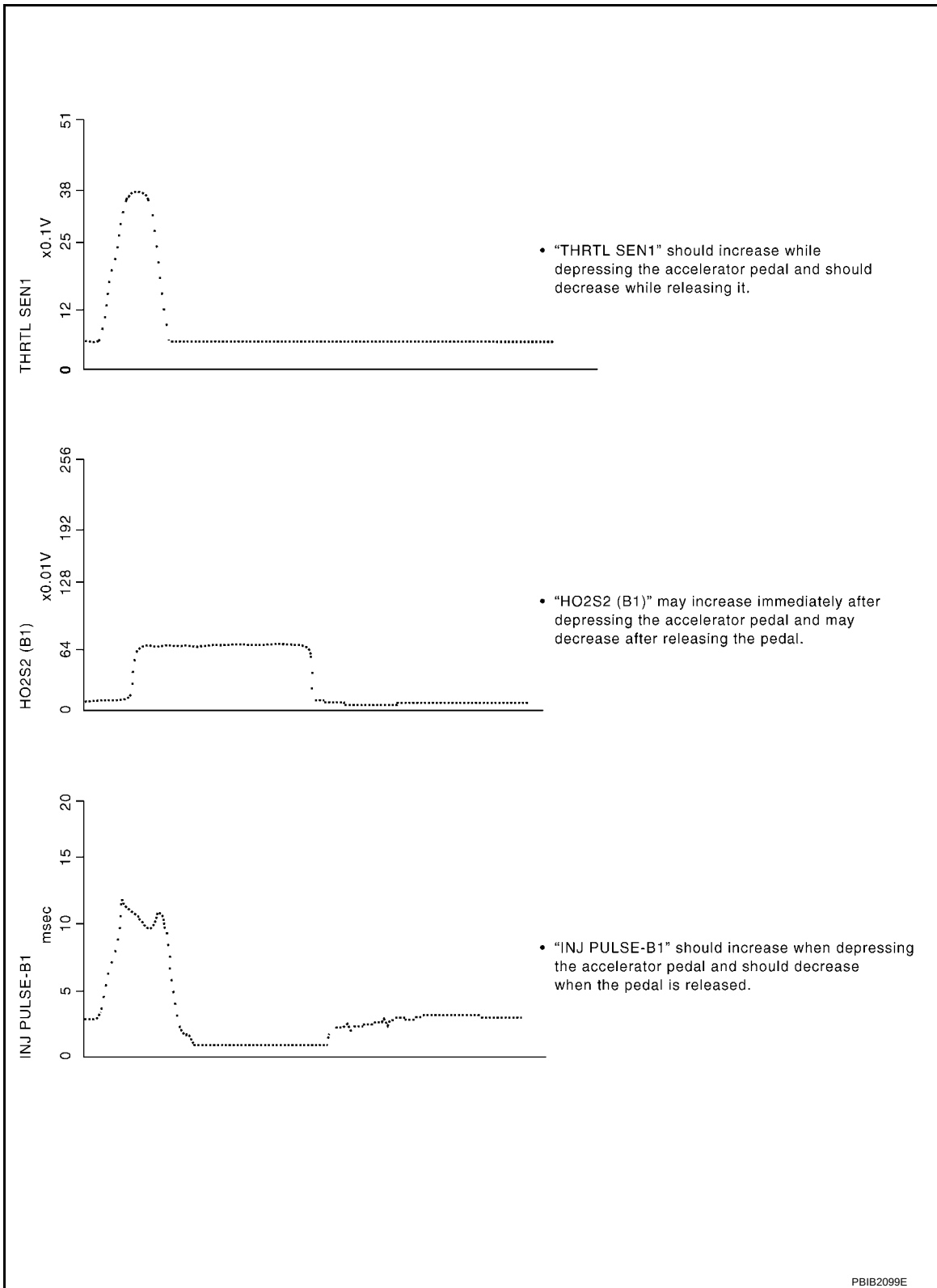
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently. Each value is for reference, the exact value may vary.



TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[VQ TYPE 2]



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000005448681

The specification (SP) value indicates the tolerance of the value that is displayed in "DATA MONITOR (SPEC)" mode of CONSULT during normal operation of the Engine Control System. When the value in "DATA MONITOR (SPEC)" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "DATA MONITOR (SPEC)" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

INFOID:000000005448682

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm², 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
- A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

INFOID:000000005448683

NOTE:

Perform "DATA MONITOR (SPEC)" mode in maximum scale display.

1. Perform [EC-560, "Basic Inspection"](#).
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2" and "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode with CONSULT.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-612, "Diagnosis Procedure"](#).

Diagnosis Procedure

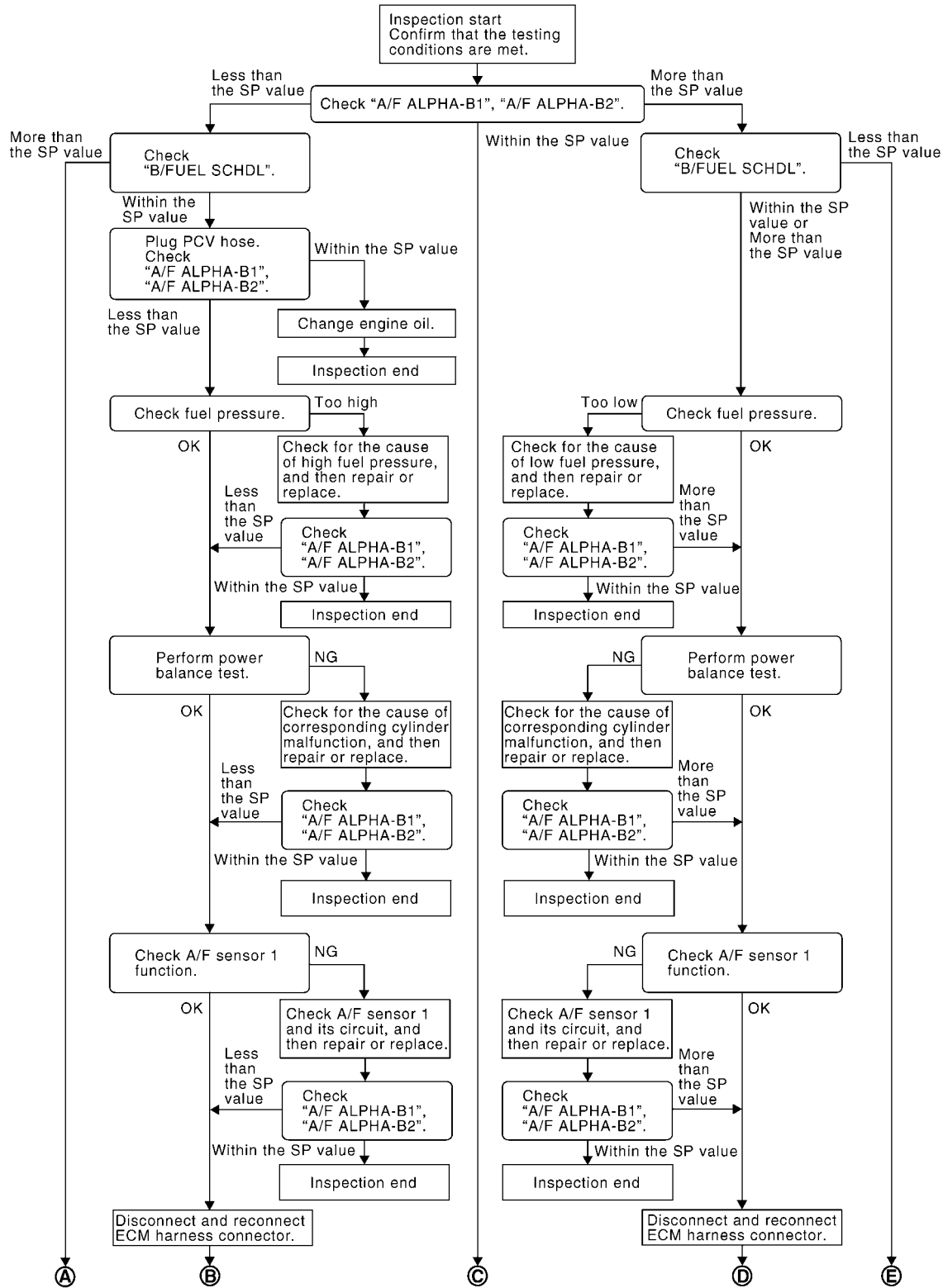
INFOID:000000005448684

OVERALL SEQUENCE

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 2]

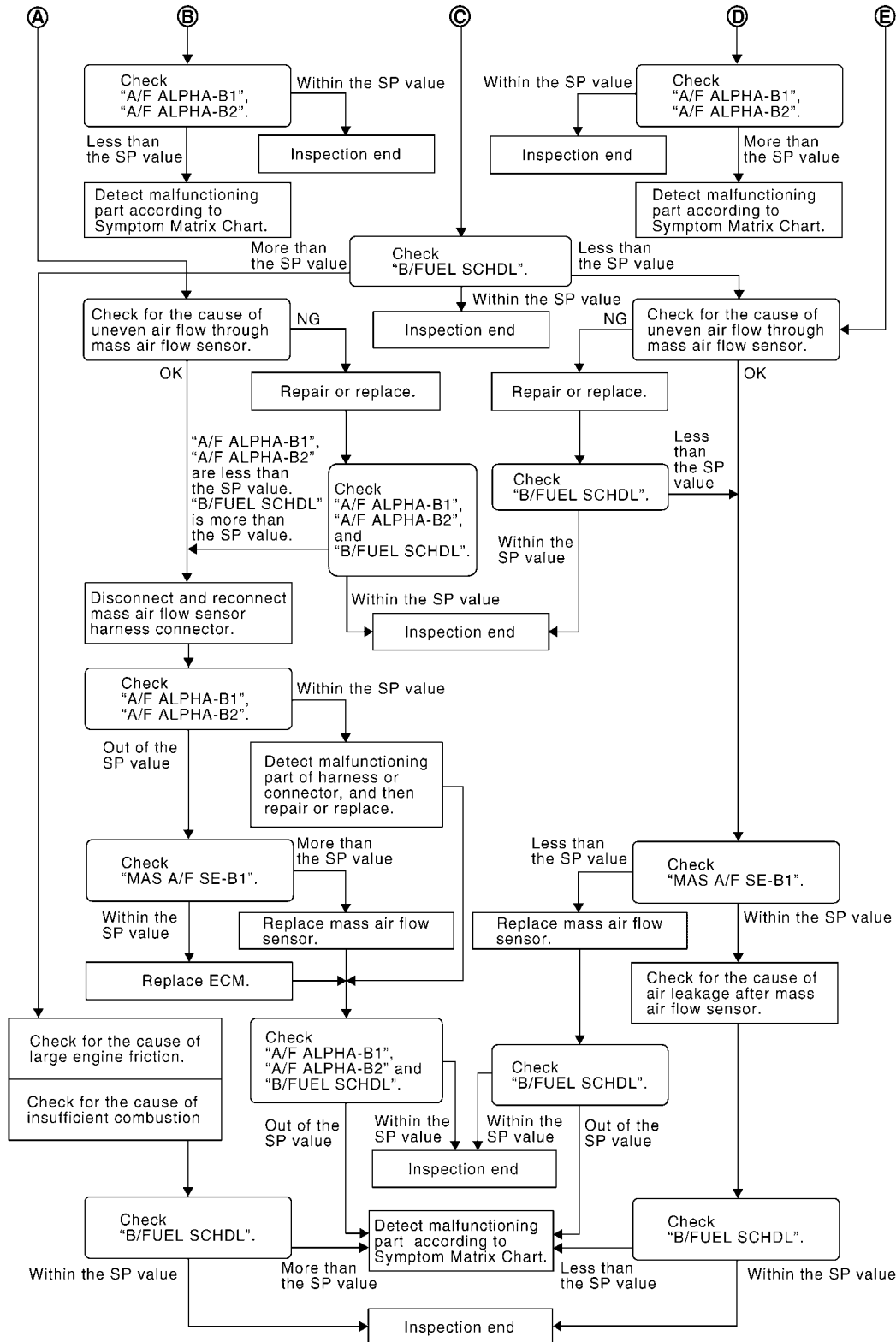


PBIB2268E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 2]



PBIB3214E

DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-612. "Testing Condition"](#).
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

NOTE:

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 2]

< SERVICE INFORMATION >

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

OK >> GO TO 17.

NG (Less than the SP value)>>GO TO 2.

NG (More than the SP value)>>GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 4.

NG (More than the SP value)>>GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 6.

NG (More than the SP value)>>GO TO 6.

NG (Less than the SP value)>>GO TO 25.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> GO TO 5.

NG >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-568. "Fuel Pressure Check"](#).)

OK or NG

OK >> GO TO 9.

NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to [EC-568. "Fuel Pressure Check"](#).
GO TO 8.

NG (Fuel pressure is too low)>>GO TO 7.

7.DETECT MALFUNCTIONING PART

1. Check the following.
 - Clogged and bent fuel hose and fuel tube
 - Clogged fuel filter
 - Fuel pump and its circuit (Refer to [EC-856](#).)
2. If NG, repair or replace the malfunctioning part. (Refer to [EC-568](#).)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

1. Check the following.
 - Ignition coil and its circuit (Refer to [EC-882.](#))
 - Fuel injector and its circuit (Refer to [EC-850.](#))
 - Intake air leakage
 - Low compression pressure (Refer to [EM-88. "On-Vehicle Service."](#))
2. If NG, repair or replace the malfunctioning part.
If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P1271, P1281, refer to [EC-744. "DTC Confirmation Procedure"](#).
- For DTC P1272, P1282, refer to [EC-752. "DTC Confirmation Procedure"](#).
- For DTC P1276, P1286, refer to [EC-760. "Overall Function Check"](#).

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 2]

< SERVICE INFORMATION >

NG >> GO TO 15.

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-577, "Symptom Matrix Chart"](#).

17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (More than the SP value)>>GO TO 18.

NG (Less than the SP value)>>GO TO 25.

18.DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
 - Engine oil level is too high
 - Engine oil viscosity
 - Belt tension of power steering, alternator, A/C compressor, etc. is excessive
 - Noise from engine
 - Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
 - Valve clearance malfunction
 - Intake valve timing control function malfunction
 - Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.

NG >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG ("B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value)>>GO TO 21.

21.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

- OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC-636](#).
2. GO TO 29.

NG >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
3. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-566, "Idle Air Volume Learning"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (Less than the SP value)>>GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

[VQ TYPE 2]

- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-577. "Symptom Matrix Chart"](#).

30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-577. "Symptom Matrix Chart"](#).

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

[VQ TYPE 2]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000005448685

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:000000005448686

1.INSPECTION START

Erase (1st trip) DTCs. Refer to [EC-553, "Emission-Related Diagnostic Information"](#).

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-627, "Ground Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace.

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:0000000005448687

A

EC

C

D

E

F

G

H

1

J

K

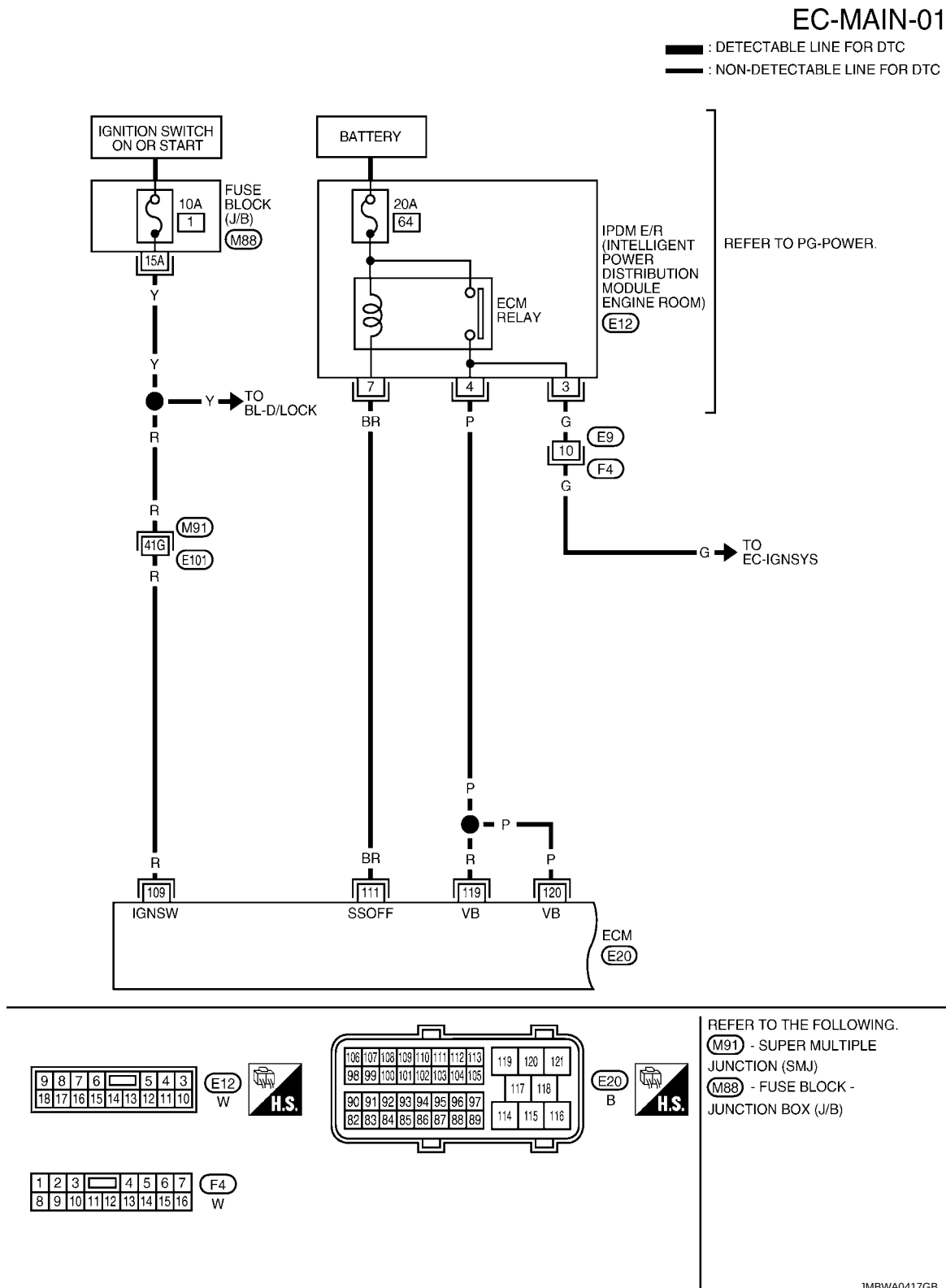
L

M

N

O

P



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	R	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

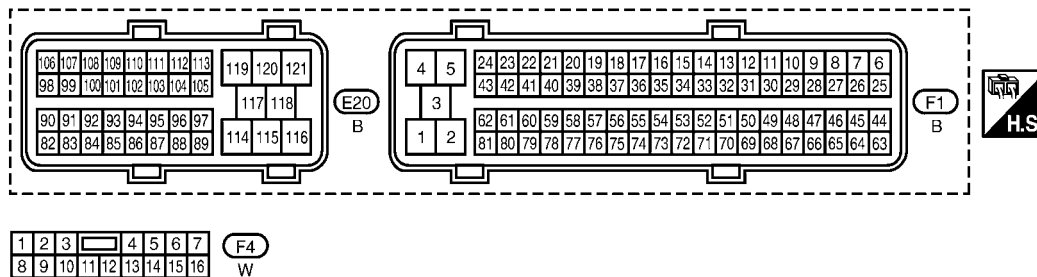
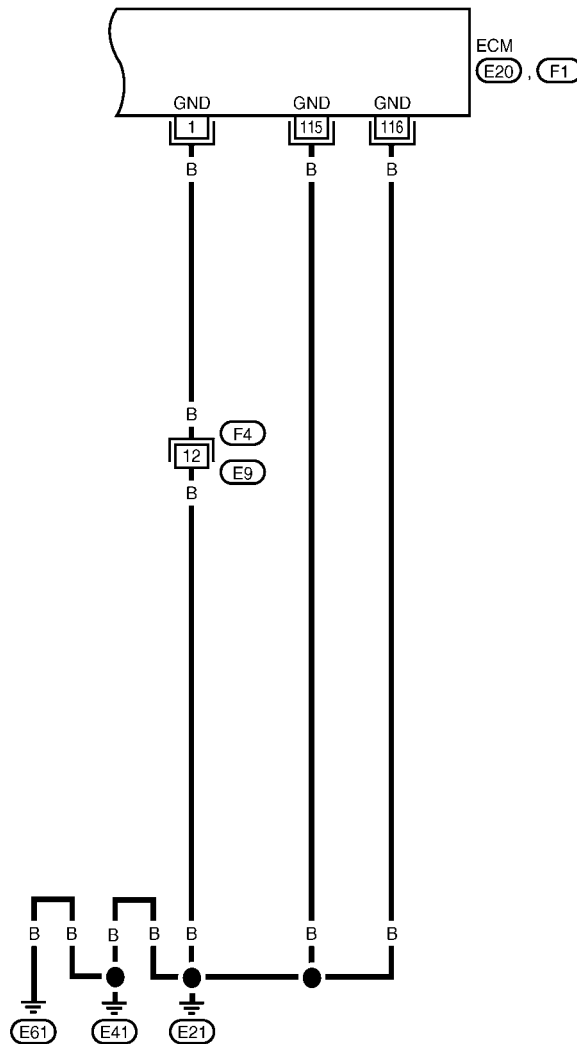
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-MAIN-02

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1275E

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] • Idle speed	Body ground
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground

Diagnosis Procedure

INFOID:000000005448688

1.INSPECTION START

Start engine.

Is engine running?

Yes or No

Yes >> GO TO 8.

No >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

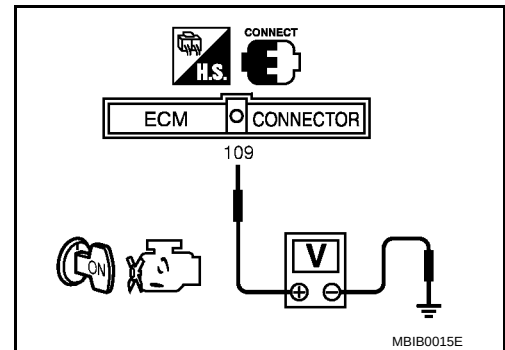
1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

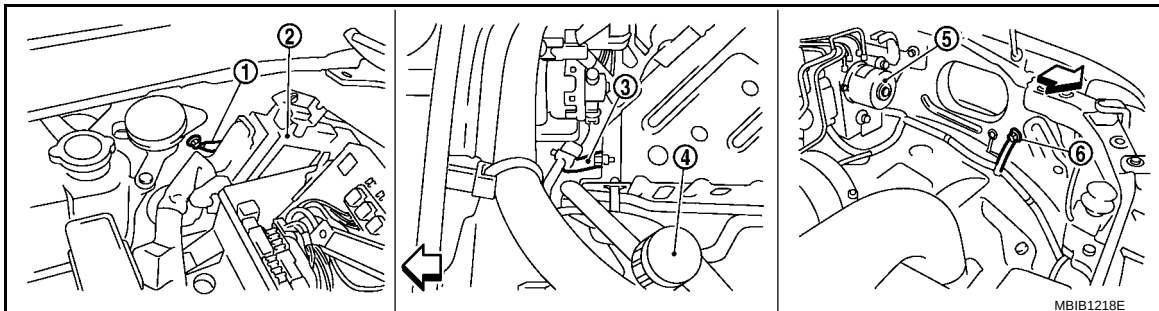
Check the following.

- Harness connectors M91, E101
- Fuse block (J/B) connector M88
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace ground connections.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

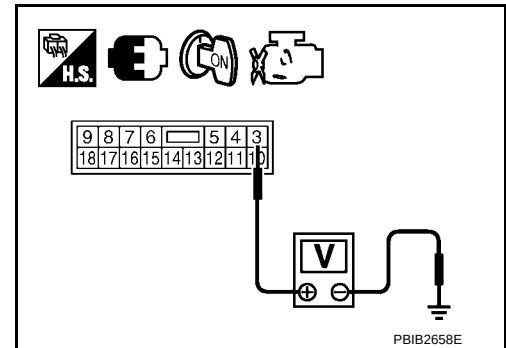
7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R connector E12 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> Go to [EC-882](#).
NG >> GO TO 8.



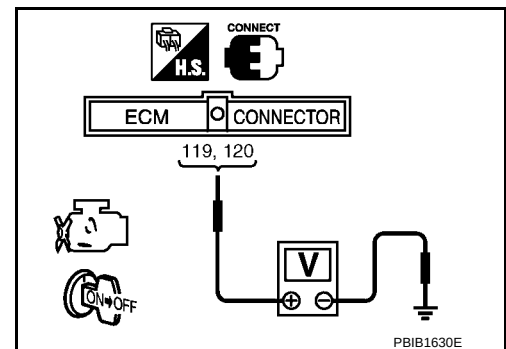
8.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

OK or NG

- OK >> GO TO 13.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.



POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

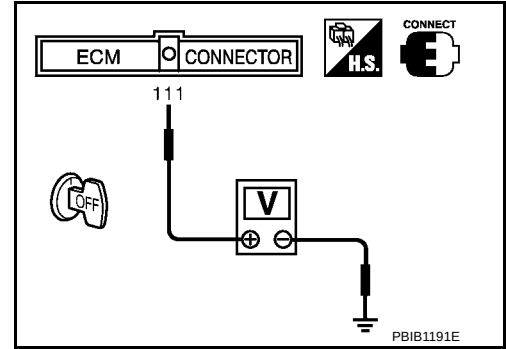
9. CHECK ECM POWER SUPPLY CIRCUIT-IV

Check voltage between ECM terminal 111 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 11.



10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 16.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 7. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 12.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

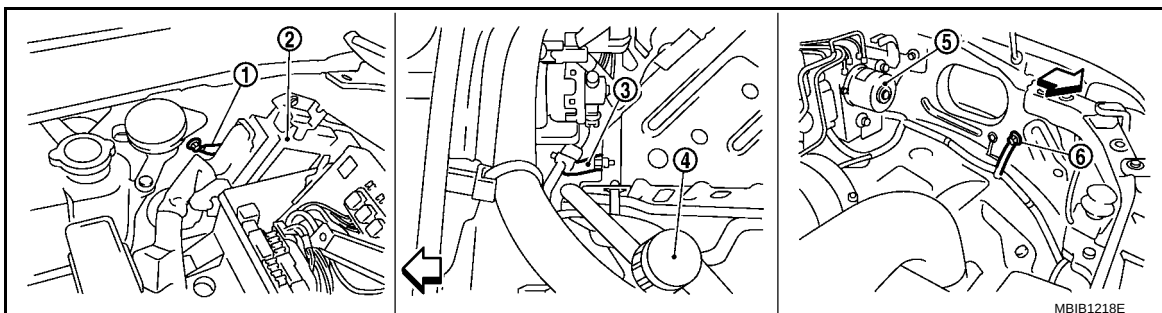
1. Disconnect 20 A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

- OK >> GO TO 16.
- NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 14.
NG >> Repair or replace ground connections.

14.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between ECM terminals 1, 115, 116 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

- OK >> GO TO 16.
NG >> GO TO 15.

15.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

16.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> Replace IPDM E/R.
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

INFOID:000000005448689

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

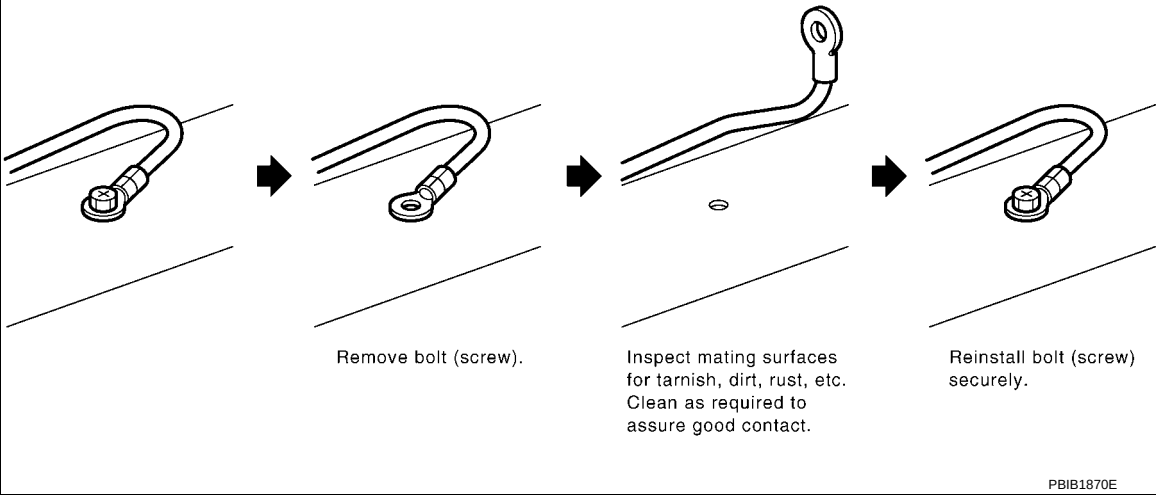
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[VQ TYPE 2]

For detailed ground distribution information, refer to [PG-36. "Ground Distribution"](#).

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC U1000, U1001 CAN COMMUNICATION LINE

Description

INFOID:000000005448690

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:000000005448691

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)
U1001 1001		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	

DTC Confirmation Procedure

INFOID:000000005448692

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-630, "Diagnosis Procedure"](#).

DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

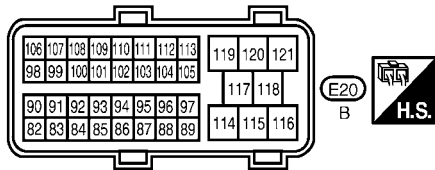
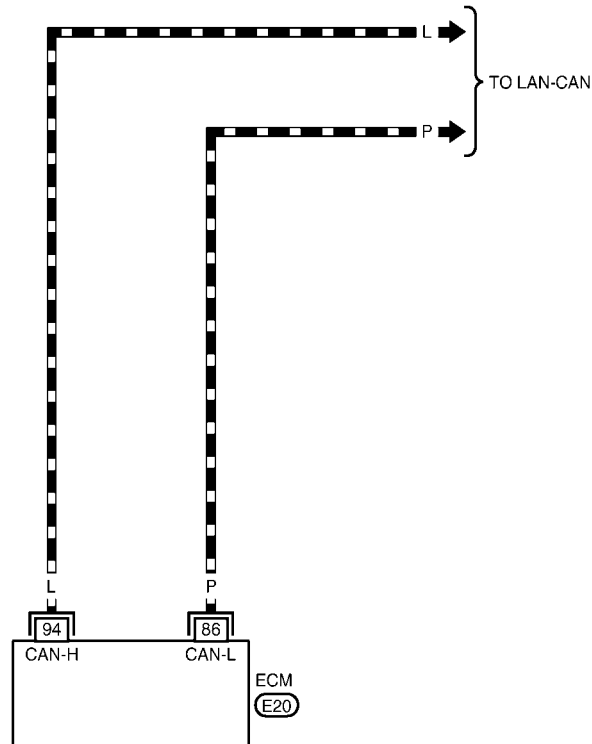
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448693

EC-CAN-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- : DATA LINE



MBWA1276E

Diagnosis Procedure

INFOID:000000005448694

Go to [LAN-46, "CAN System Specification Chart"](#).

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P0011, P0021 IVT CONTROL

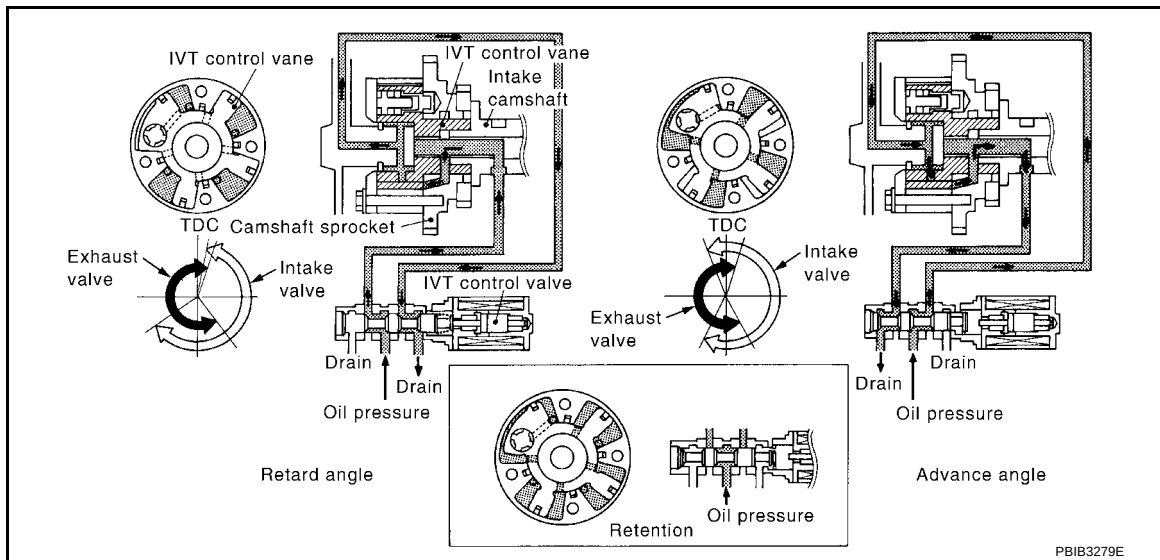
Description

INFOID:000000005448695

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448696

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	-5 - 5°C
		2,000 rpm	Approx. 0 - 30°C
INT/V SOL (B1) INT/V SOL (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

INFOID:000000005448697

The MIL will not light up for this diagnosis.

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011 (Bank 1)	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control
P0021 0021 (Bank 2)			

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function.

DTC Confirmation Procedure

INFOID:000000005448698

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to [EC-700](#).
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

3. Stop vehicle with engine running and let engine idle for 10 seconds.
4. Check 1st trip DTC.
5. If the 1st trip DTC is detected, go to [EC-633, "Diagnosis Procedure"](#).
If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. Check 1st trip DTC.
8. If the 1st trip DTC is detected, go to [EC-633, "Diagnosis Procedure"](#).

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VQ TYPE 2]

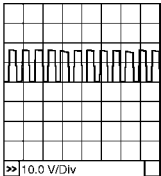
Overall Function Check

INFOID:000000005448699

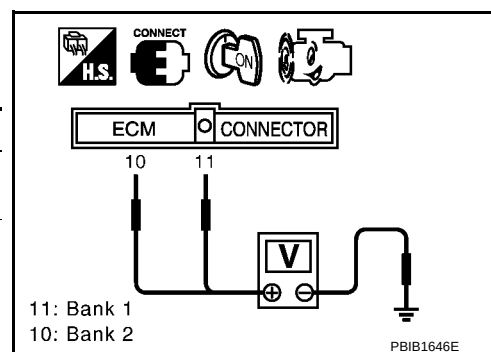
Use this procedure to check the overall function of the intake valve timing control system. During this check, a 1st trip DTC might not be confirmed.

⊗ WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Set the tester probe between ECM terminal 11 [IVT control solenoid valve (bank 1) signal] or 10 [IVT control solenoid valve (bank 2) signal] and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
Verify that the oscilloscope screen shows the signal wave as shown below.

Conditions	Voltage
At idle	BATTERY VOLTAGE (11 - 14V)
2,500 rpm	7V - 12V ★ 

PBIB1790E



★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

7. If NG, go to [EC-633, "Diagnosis Procedure"](#).

Diagnosis Procedure

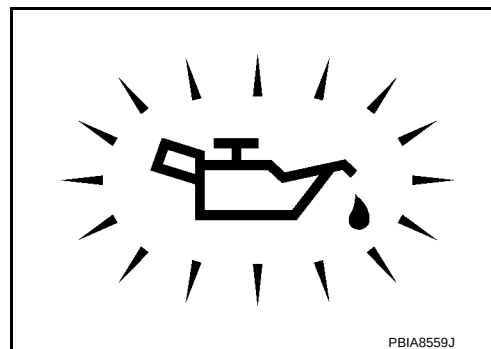
INFOID:000000005448700

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

OK or NG

- OK >> GO TO 2.
KG >> Go to [LU-6, "Inspection"](#).



2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-634, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-672, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.

DTC P0011, P0021 IVT CONTROL

[VQ TYPE 2]

< SERVICE INFORMATION >

OK >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-680, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

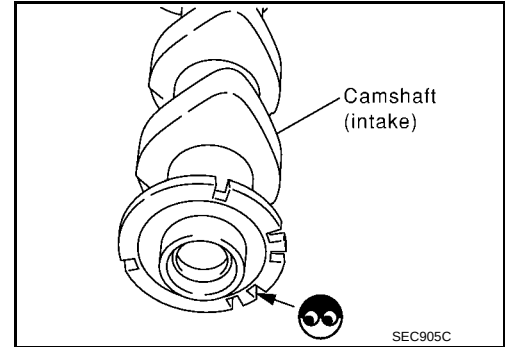
Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 6.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

Yes or No

Yes >> Check timing chain installation. Refer to [EM-53](#).

No >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to [EM-72, "Removal and Installation"](#).

OK or NG

OK >> GO TO 8.

NG >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

For Wiring Diagram, refer to [EC-669](#) for CKP sensor (POS) and [EC-675](#) for CMP sensor (PHASE).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448701

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

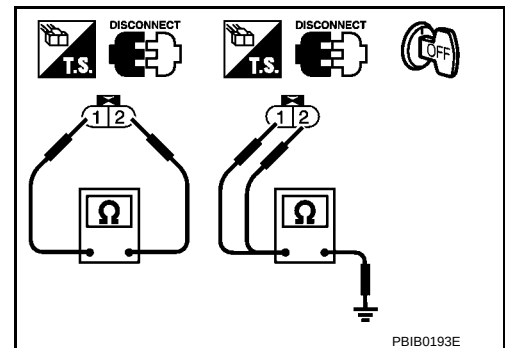
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.

If OK, go to next step.

3. Remove intake valve timing control solenoid valve.



DTC P0011, P0021 IVT CONTROL

[VQ TYPE 2]

< SERVICE INFORMATION >

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

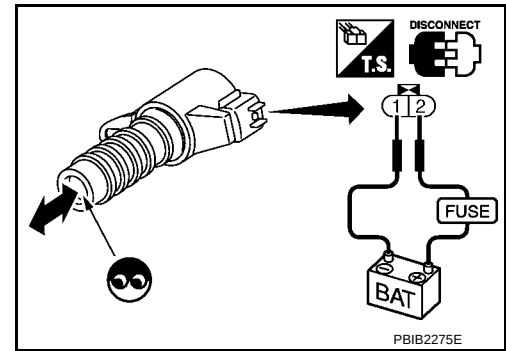
CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



INFOID:000000005448702

Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

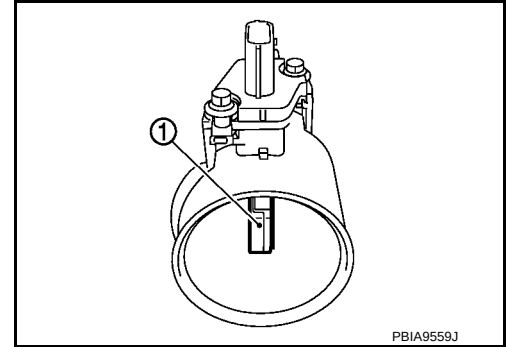
DTC P0102, P0103 MAF SENSOR

Component Description

INFOID:000000005448703

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, electric current is supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448704

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	See EC-612 .	

On Board Diagnosis Logic

INFOID:000000005448705

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

INFOID:000000005448706

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).

Without CONSULT

1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

4. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).

PROCEDURE FOR DTC P0103

With CONSULT

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).
If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. Check DTC.
7. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).

Without CONSULT

1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).
If DTC is not detected, go to next step.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and wait at least 5 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to [EC-639, "Diagnosis Procedure"](#).

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DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

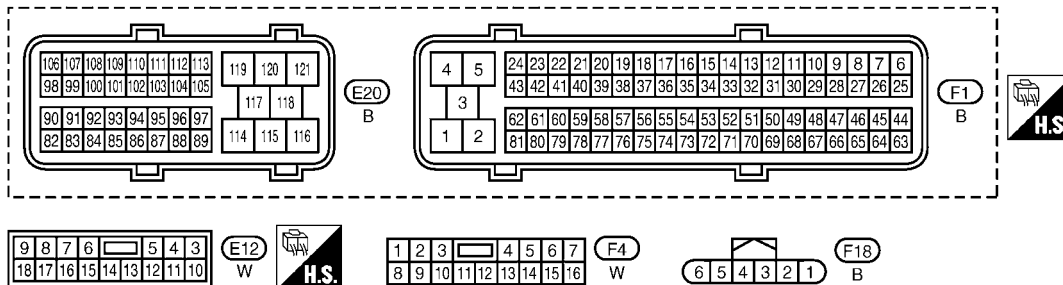
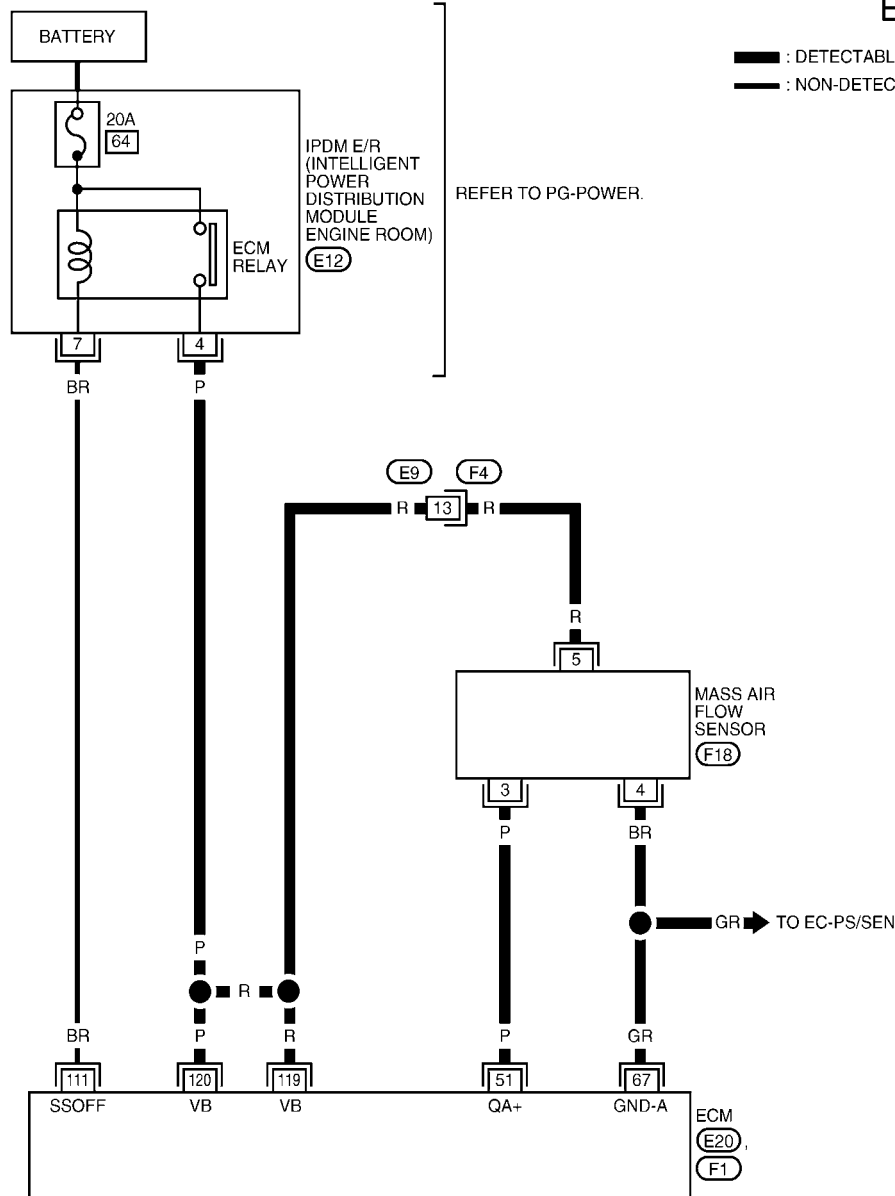
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448707

EC-MAFS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	P	Mass air flow sensor	[Ignition switch: ON]	Approximately 0.4V
			[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2V
			[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448708

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

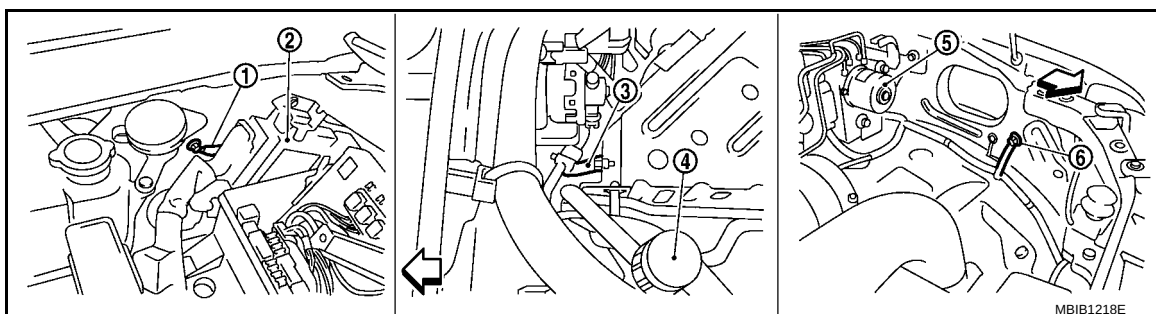
OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

↩ : Vehicle front

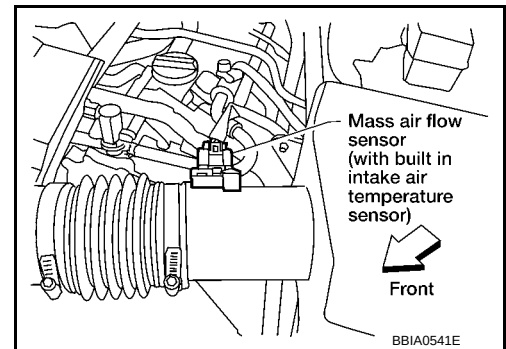
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace ground connections.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.

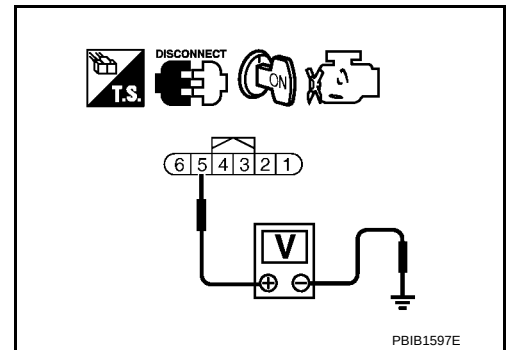


3. Check voltage between MAF sensor terminal 5 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 4 and ECM terminal 67.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 3 and ECM terminal 51.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-641, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448709

MASS AIR FLOW SENSOR

 With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
 - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

 Without CONSULT

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

DTC P0102, P0103 MAF SENSOR

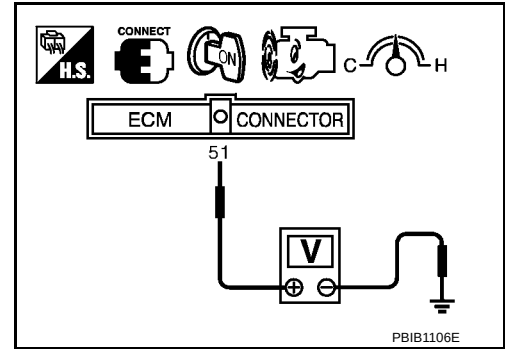
[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.
- Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Improper specification of intake air system parts
 - If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:000000005448710

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

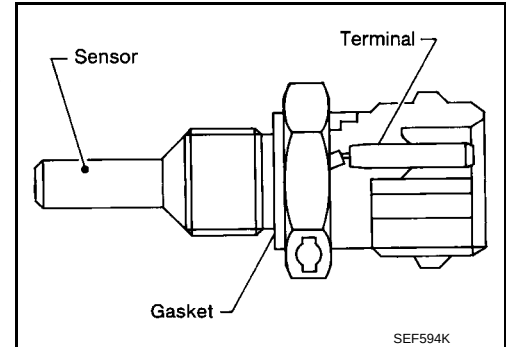
[VQ TYPE 2]

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:000000005448711

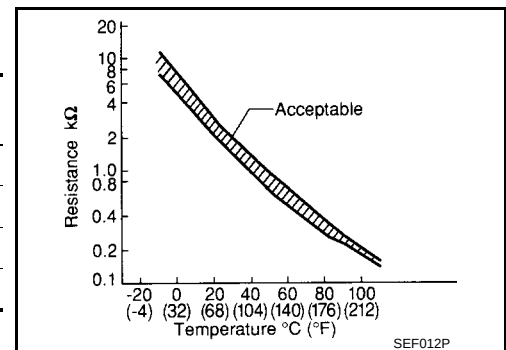
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:000000005448712

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or START	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

DTC Confirmation Procedure

INFOID:000000005448713

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-645, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-645, "Diagnosis Procedure"](#).

DTC P0117, P0118 ECT SENSOR

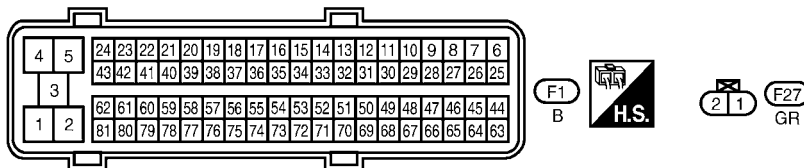
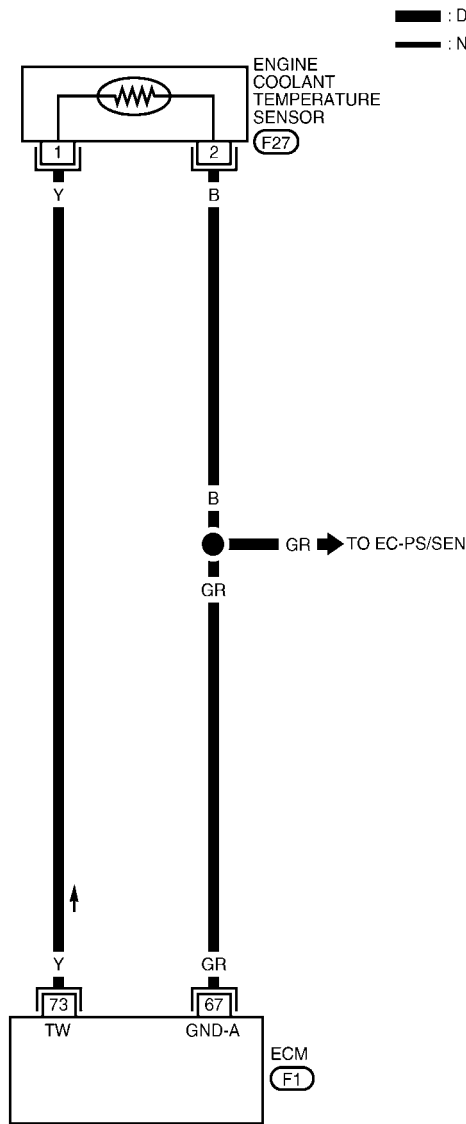
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448714

EC-ECTS-01



MBWA1281E

Diagnosis Procedure

INFOID:000000005448715

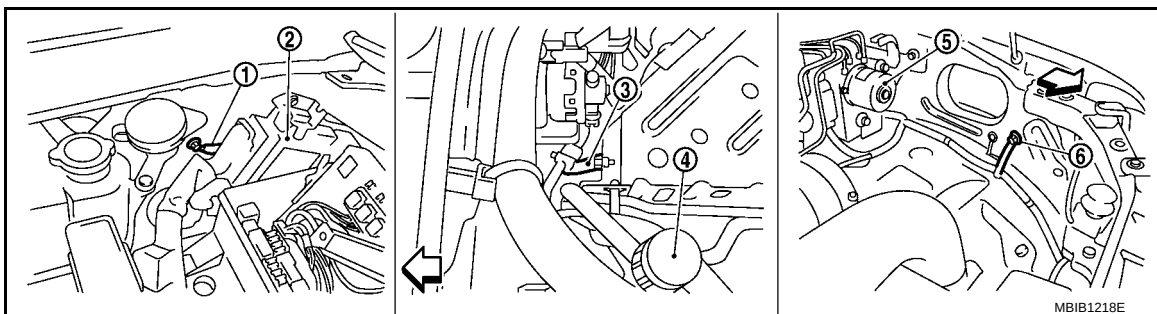
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627. "Ground Inspection"](#).

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

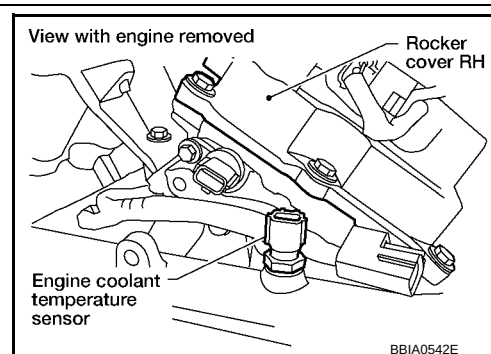
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



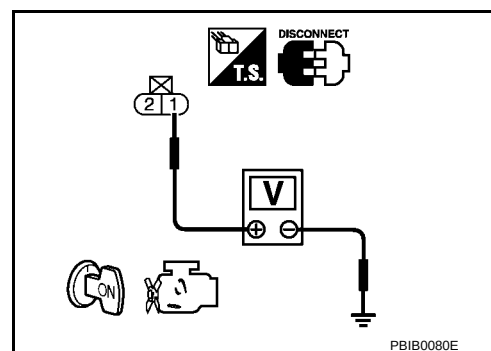
3. Check voltage between ECT sensor terminal 1 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-647](#). "Component Inspection".

OK or NG

OK >> GO TO 5.

NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

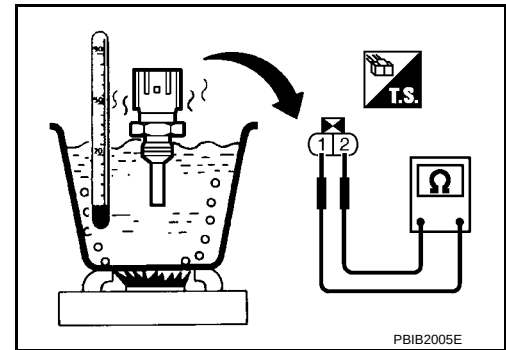
>> INSPECTION END

Component Inspection

INFOID:000000005448716

ENGINE COOLANT TEMPERATURE SENSOR

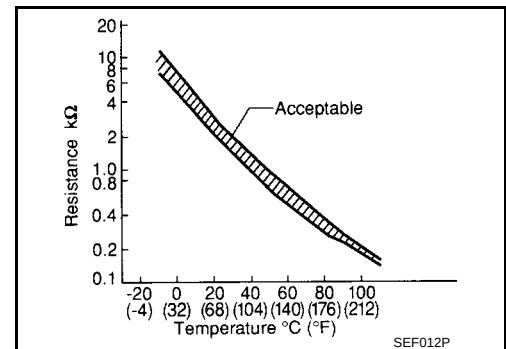
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

INFOID:000000005448717

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-30](#).

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

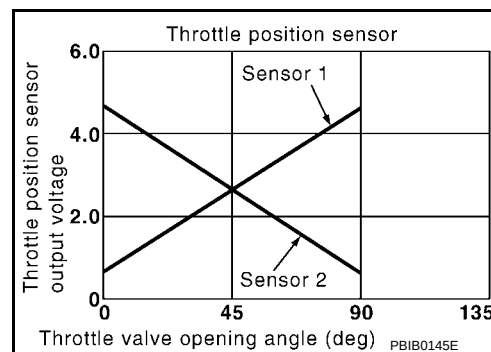
DTC P0122, P0123 TP SENSOR

Component Description

INFOID:000000005448718

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448719

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448720

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (The TP sensor 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 2) • Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448721

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P0122, P0123 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Check DTC.
3. If DTC is detected, go to [EC-651, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-651, "Diagnosis Procedure"](#).

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DTC P0122, P0123 TP SENSOR

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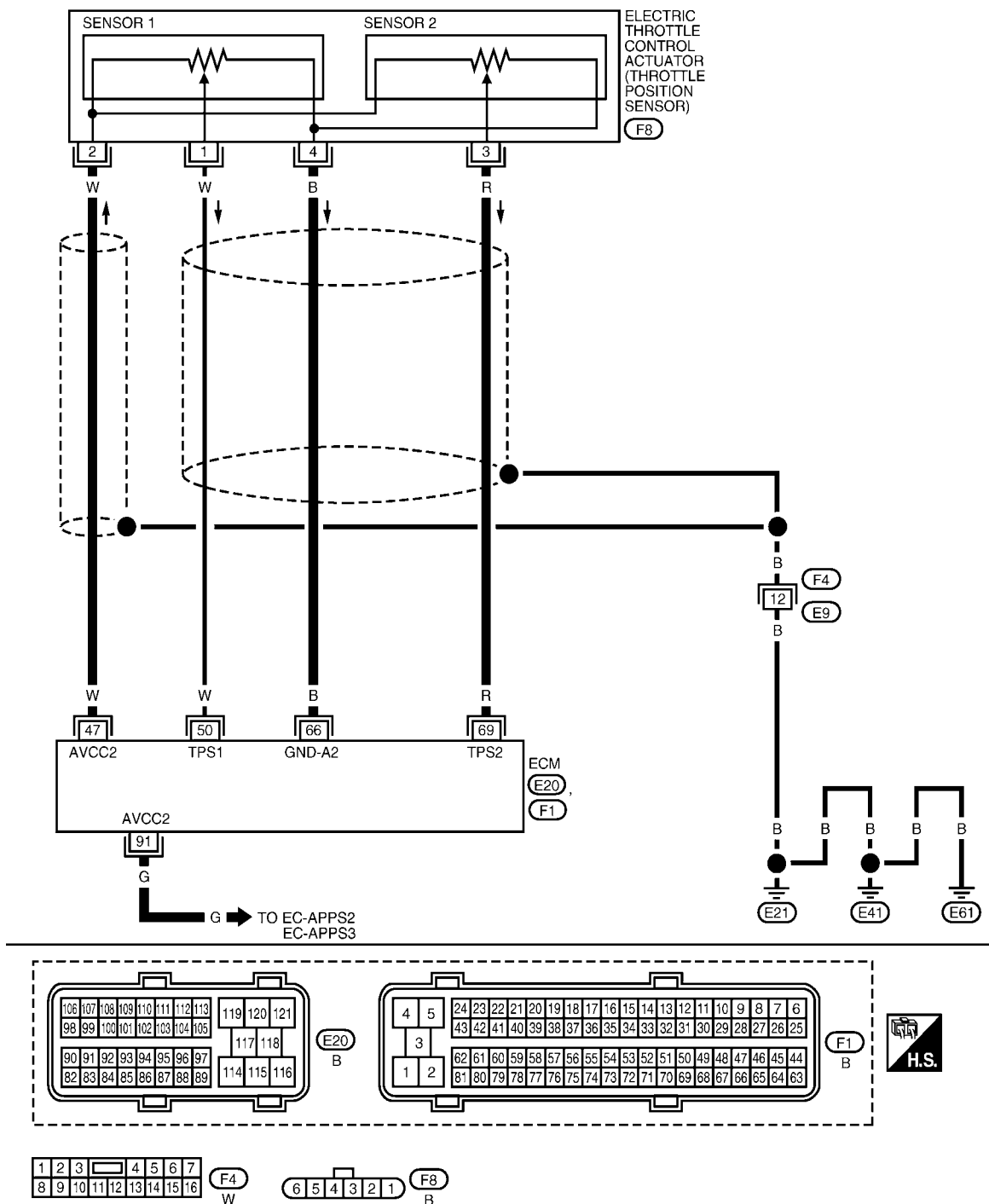
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448722

EC-TPS2-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1282E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

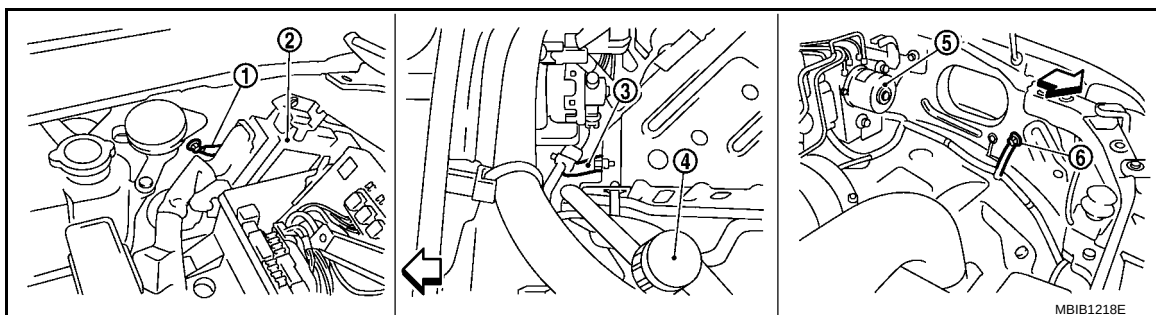
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448723

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

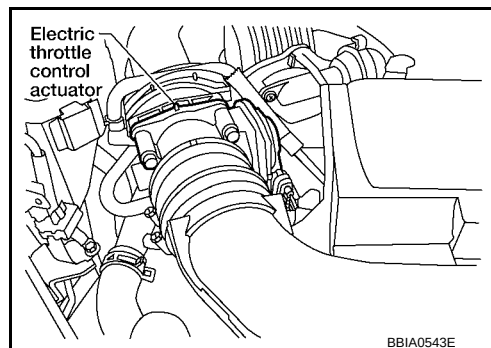
2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

DTC P0122, P0123 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

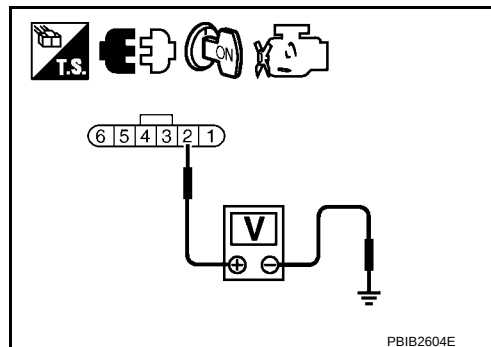


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-650
91	APP sensor terminal 1	EC-805

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-808, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to [EC-653. "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566. "Idle Air Volume Learning"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448724

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-566. "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

DTC P0122, P0123 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

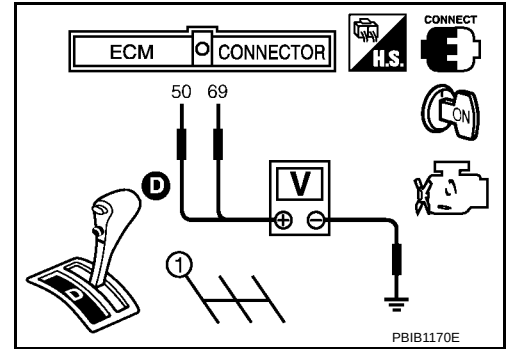
7. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-566, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



INFOID:0000000005448725

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

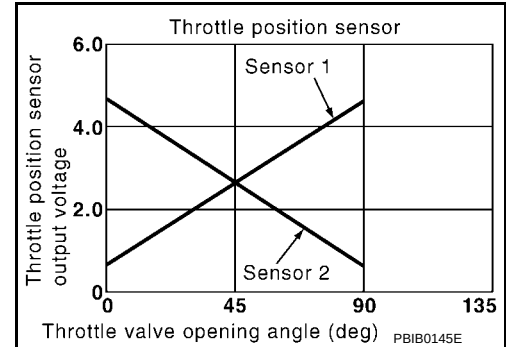
DTC P0222, P0223 TP SENSOR

Component Description

INFOID:000000005448726

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448727

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448728

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (The TP sensor 1 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor. (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448729

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P0222, P0223 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Check DTC.
3. If DTC is detected, go to [EC-658, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-658, "Diagnosis Procedure"](#).

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

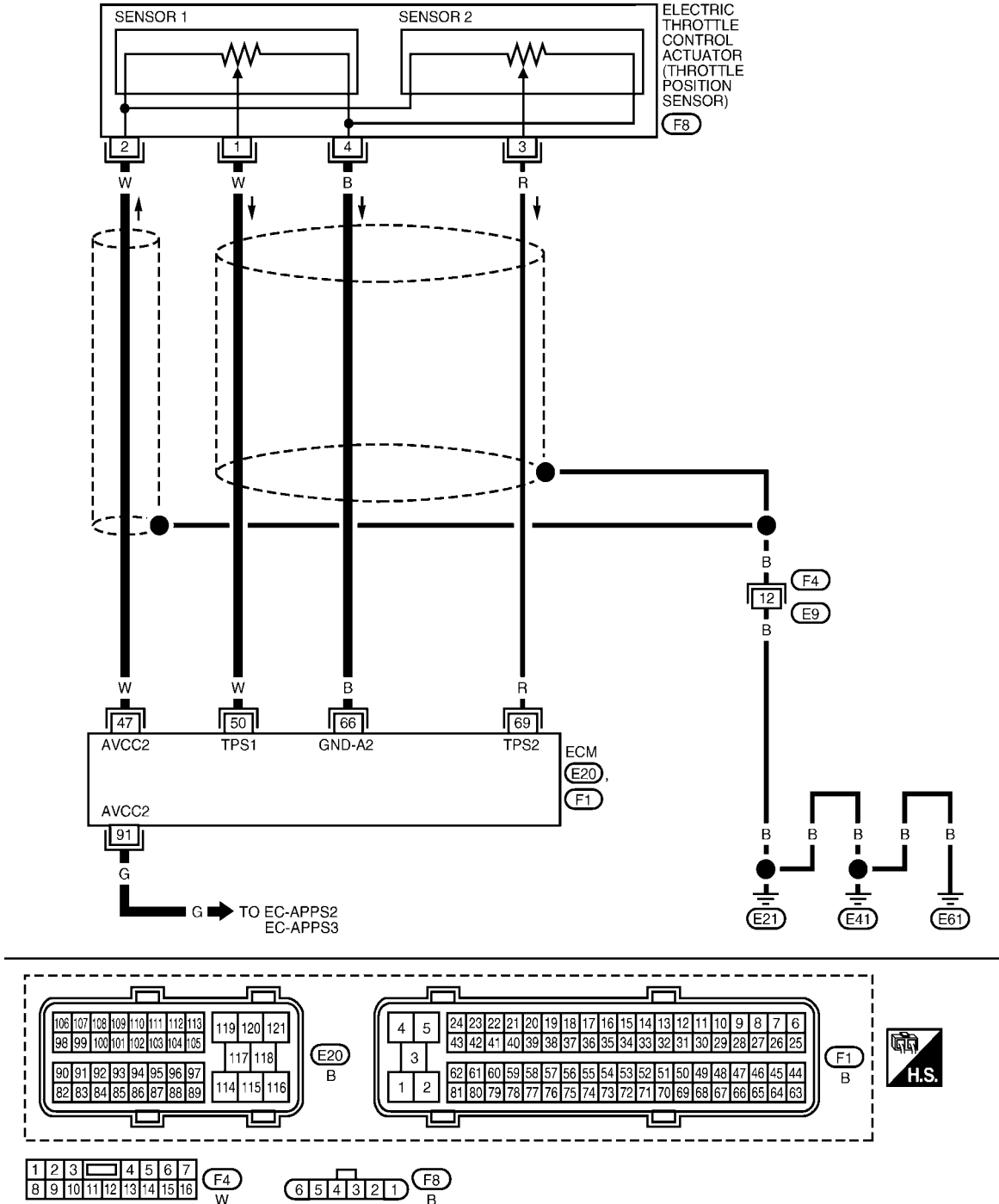
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448730

EC-TPS1-01

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1288E

DTC P0222, P0223 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

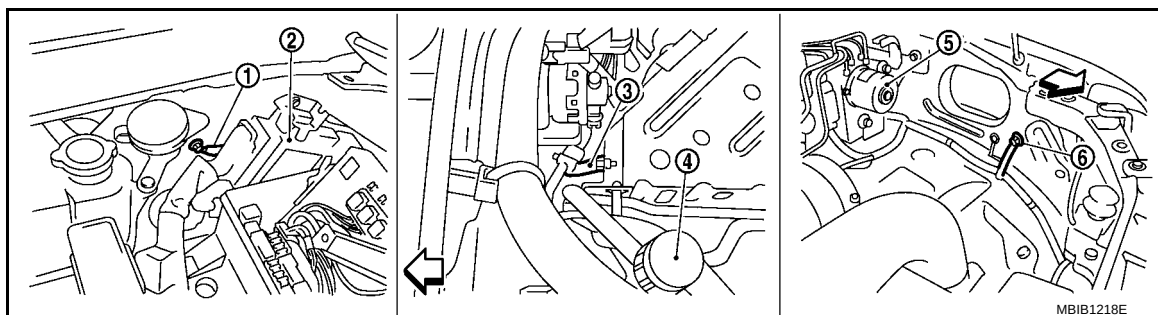
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448731

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

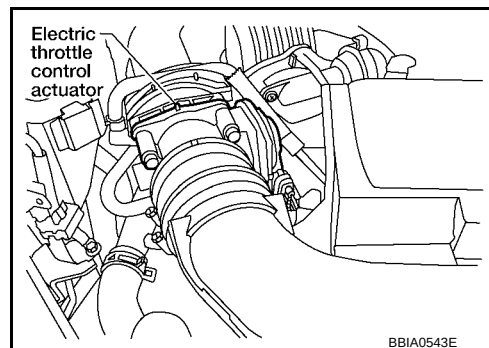
2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

DTC P0222, P0223 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

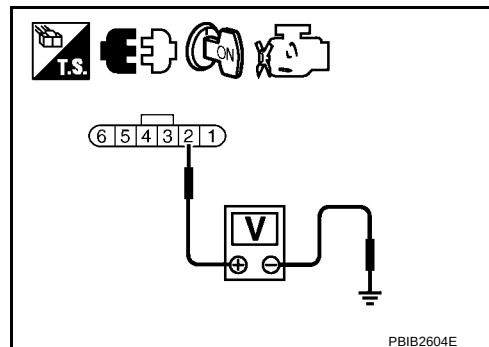


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-657
91	APP sensor terminal 1	EC-805

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-808, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

7.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK THROTTLE POSITION SENSOR

Refer to [EC-660, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:0000000005448732

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

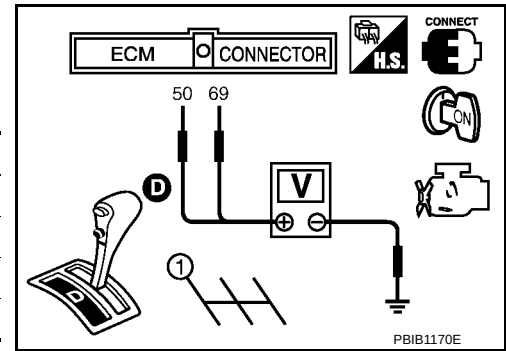
7. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-566, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



INFOID:000000005448733

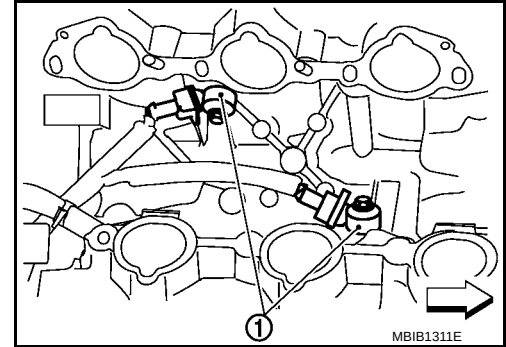
DTC P0327, P0328, P0332, P0333 KS

Component Description

INFOID:000000005448734

The knock sensor (1) is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

- : Vehicle front



On Board Diagnosis Logic

INFOID:000000005448735

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (bank 1)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0332 0332 (bank 2)			
P0328 0328 (bank 1)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	
P0333 0333 (bank 2)			

DTC Confirmation Procedure

INFOID:000000005448736

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

 WITH CONSULT

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-664, "Diagnosis Procedure"](#).

 WITHOUT CONSULT

1. Start engine and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-664, "Diagnosis Procedure"](#).

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

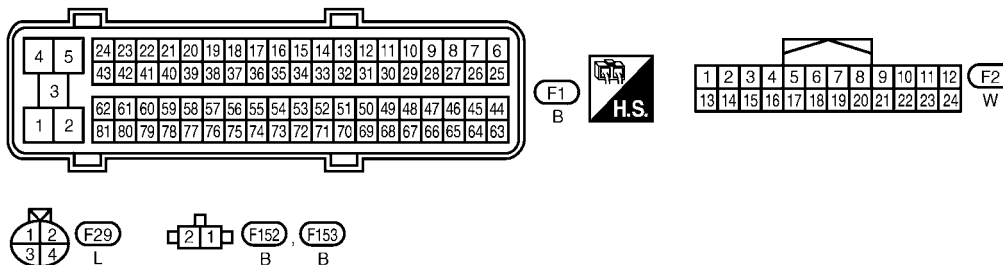
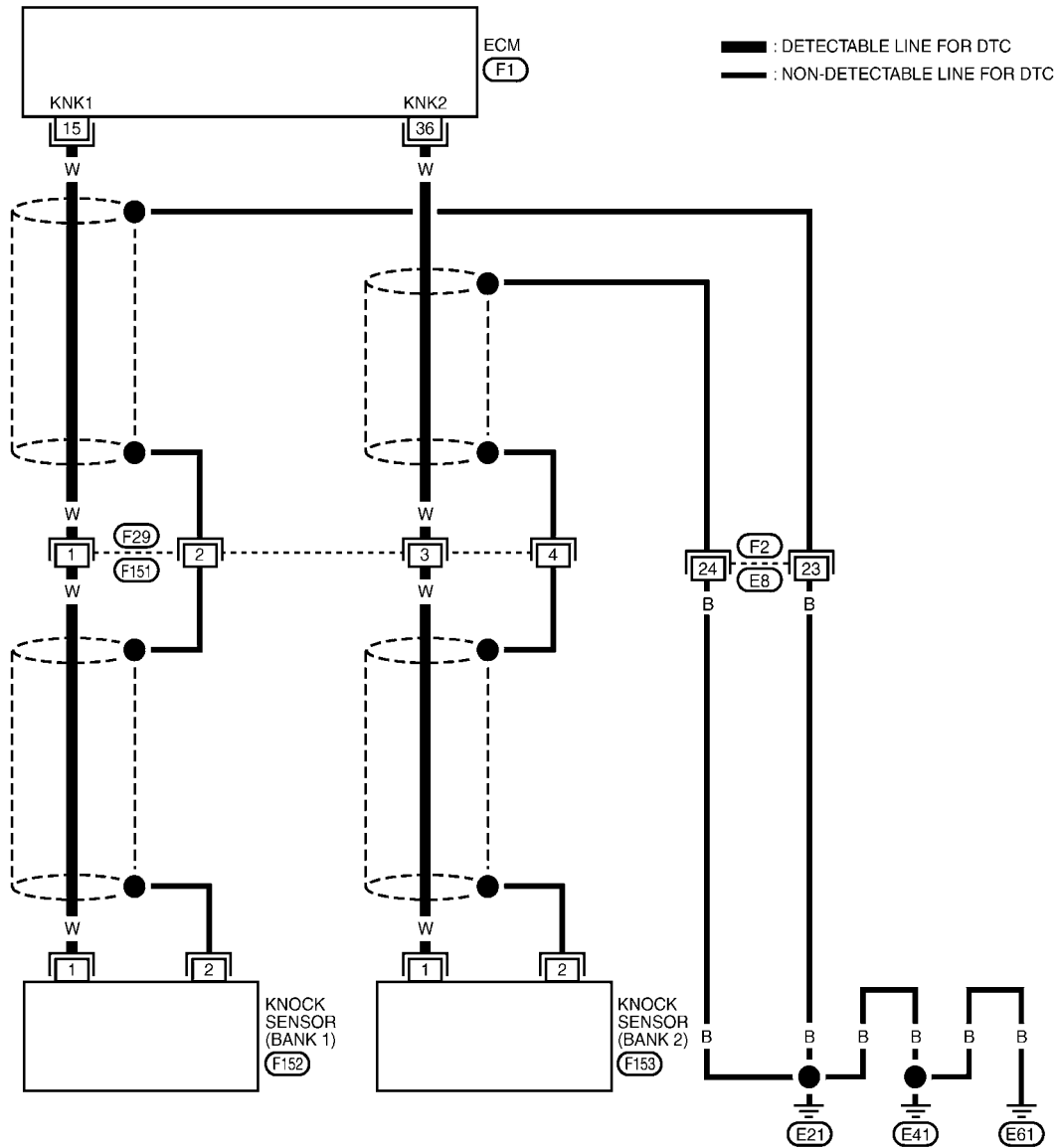
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448737

EC-KS-01

EC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1289E

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W W	Knock sensor (Bank 1) Knock sensor (Bank 2)	[Engine is running] • Idle speed	Approximately 2.5V

Diagnosis Procedure

INFOID:000000005448738

1.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 2.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor (1) harness connector.
- ⇐: Vehicle front
2. Check harness continuity between ECM terminal 15 and knock sensor (bank1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

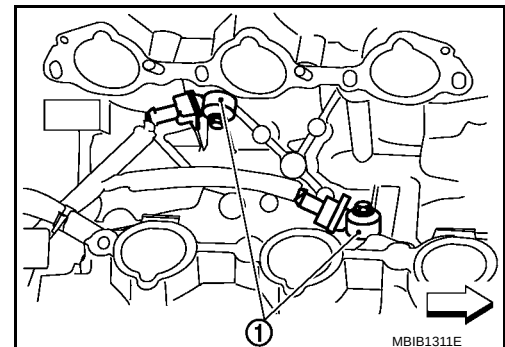
Refer to [EC-665, "Component Inspection"](#).

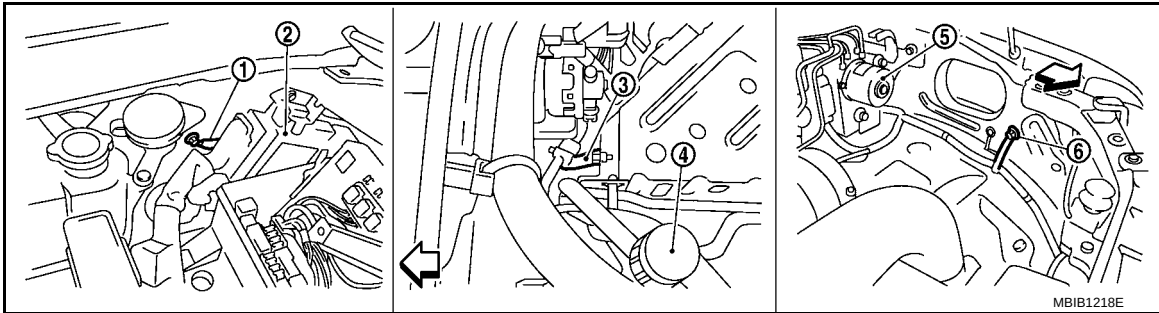
OK or NG

- OK >> GO TO 5.
NG >> Replace knock sensor.

5.CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body.
Refer to [EC-627, "Ground Inspection"](#).





← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 6.
NG >> Repair or replace ground connections.

6.CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check for short to power.

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness connectors F2, E8
- Harness for open or short between knock sensor and ground

>> Repair open circuit or short power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448739

KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

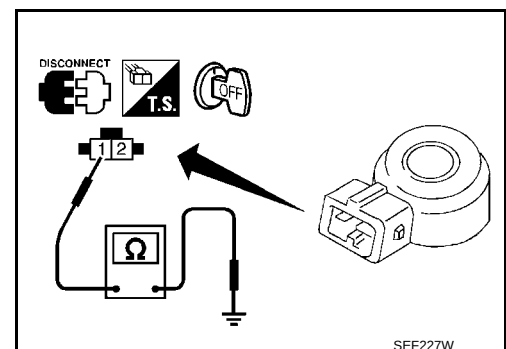
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



SEF227W

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

[VQ TYPE 2]

Removal and Installation

INFOID:000000005448740

KNOCK SENSOR

Refer to [EM-104](#).

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:000000005448741

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

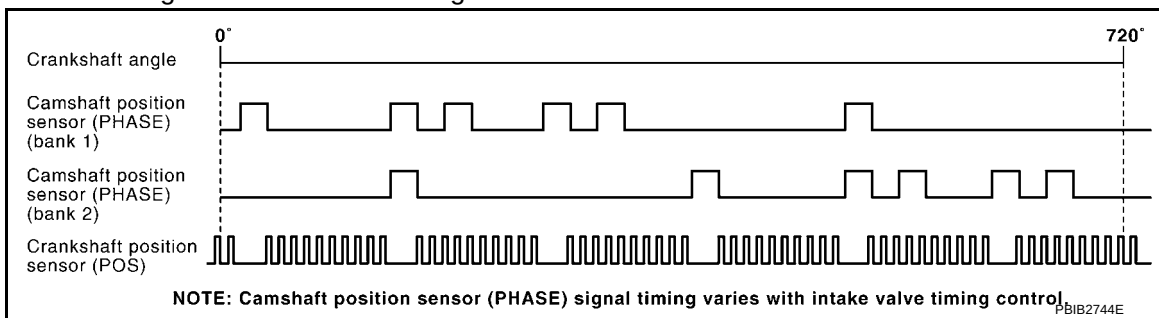
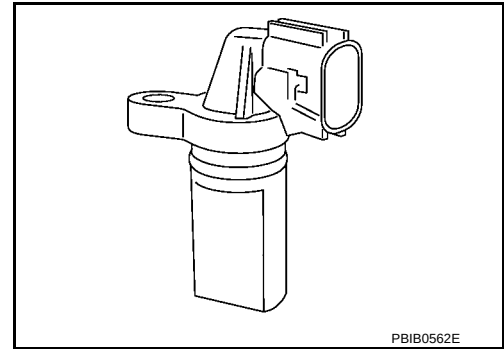
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448742

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005448743

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Crankshaft position sensor (POS) • Signal plate

DTC Confirmation Procedure

INFOID:000000005448744

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

DTC P0335 CKP SENSOR (POS)

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-670, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-670, "Diagnosis Procedure"](#).

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

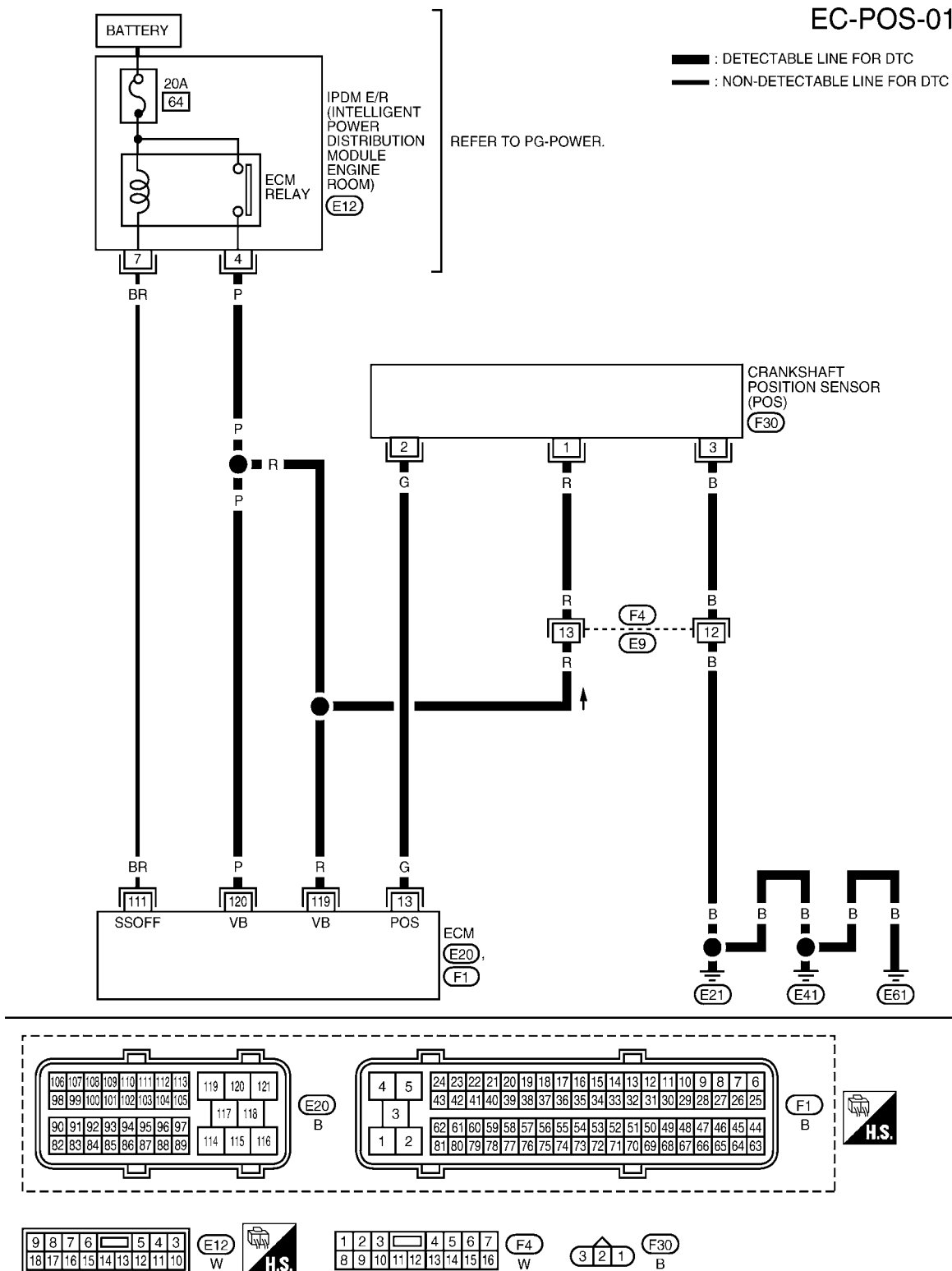
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448745

EC-POS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

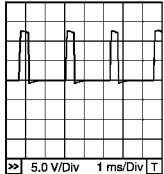
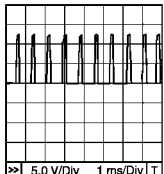
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	G	Crankshaft position sensor (POS)	[Engine is running] - Warm-up condition - Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

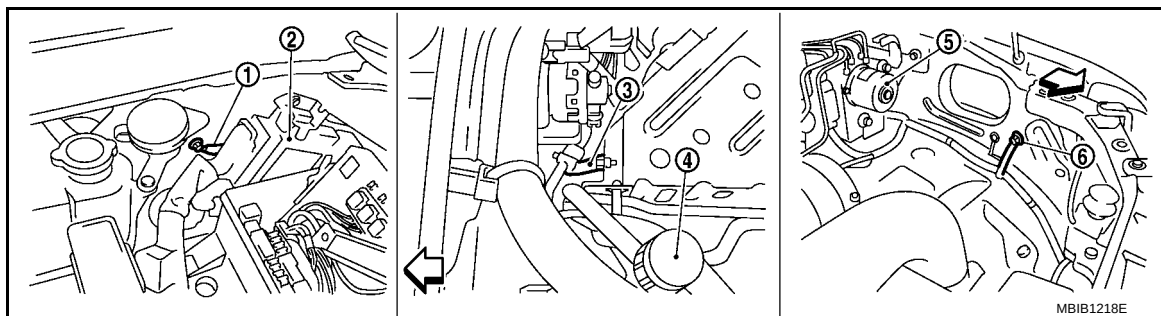
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448746

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

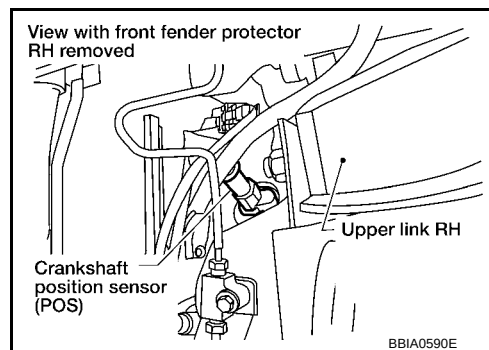
DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

[VQ TYPE 2]

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.

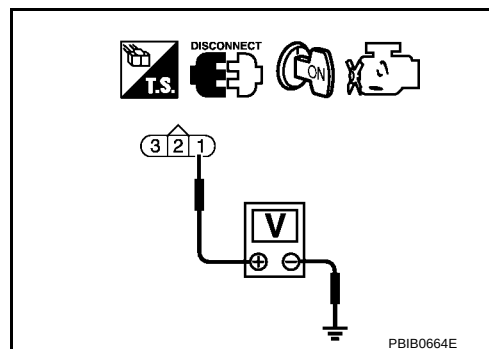


3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ground

>> Repair open circuit or short to power in harness or connectors.

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

DTC P0335 CKP SENSOR (POS)

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-672, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.

NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

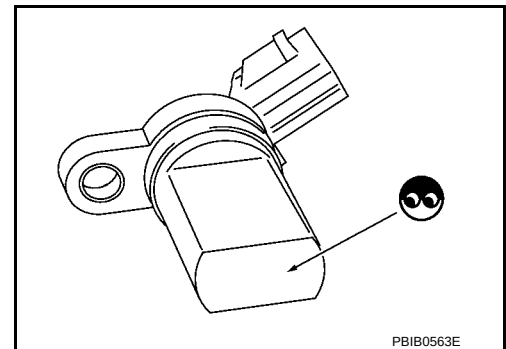
>> **INSPECTION END**

Component Inspection

INFOID:000000005448747

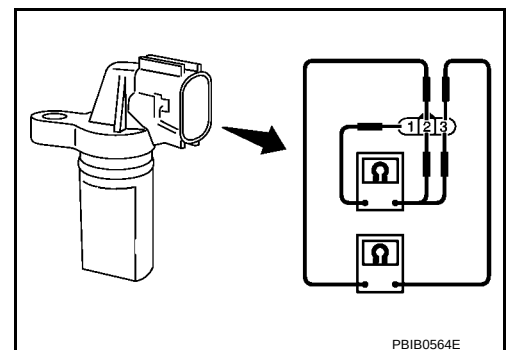
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

INFOID:000000005448748

CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-28](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P0340, P0345 CMP SENSOR (PHASE)

Component Description

INFOID:000000005448749

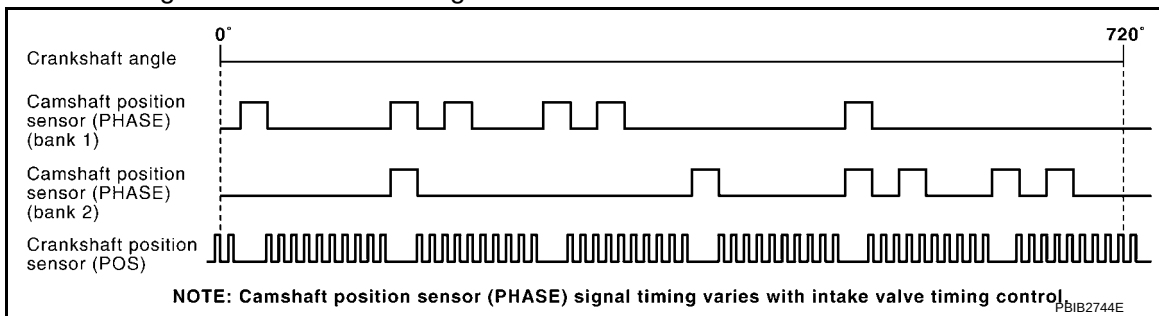
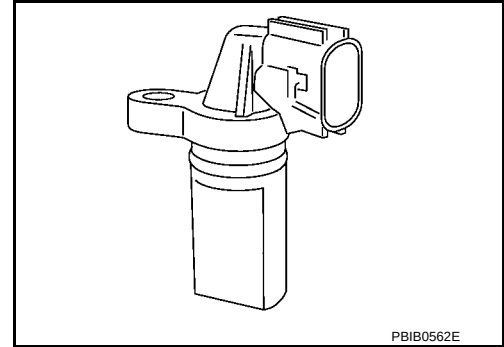
The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448750

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000005448751

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1)	Camshaft position sensor (PHASE) circuit	- The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. - The cylinder No. signal is not sent to ECM during engine running. - The cylinder No. signal is not in the normal pattern during engine running.	- Harness or connectors (The sensor circuit is open or shorted) - Camshaft position sensor (PHASE) - Camshaft (Intake) - Starter motor (Refer to SC-35.) - Starting system circuit (Refer to SC-35.) - Dead (Weak) battery
P0345 0345 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448752

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-678, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
4. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-678, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-678, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
5. Start engine and maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If 1st trip DTC is detected, go to [EC-678, "Diagnosis Procedure"](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

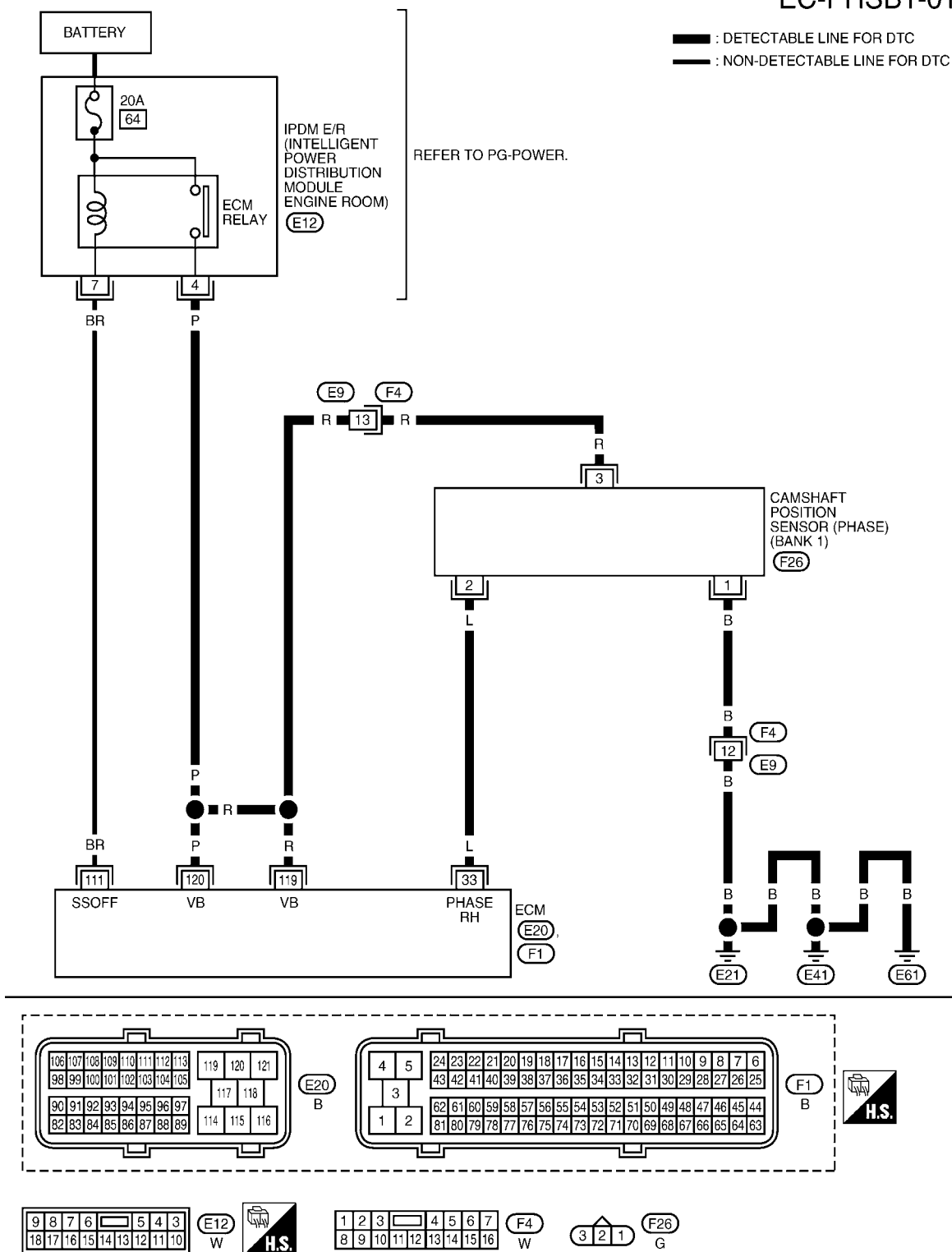
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448753

BANK 1

EC-PHSB1-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

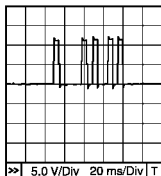
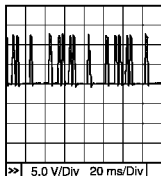
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

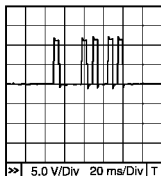
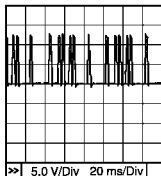
[VQ TYPE 2]

EC-PHSB2-01

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE) (Bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448754

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

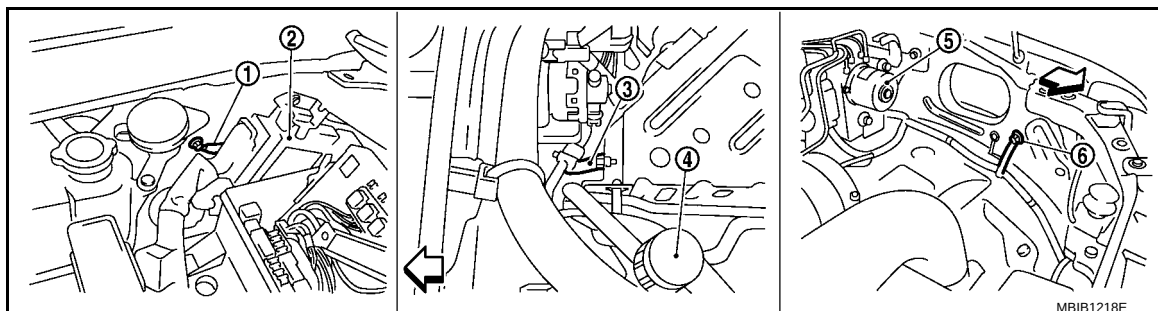
Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-35](#).)

2.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



MBIB1218E

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

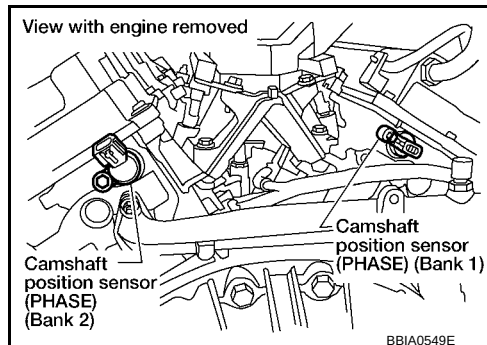
OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



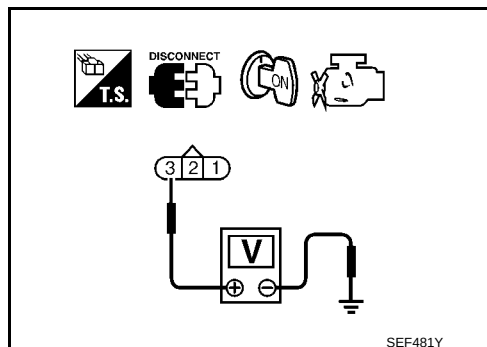
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between CMP sensor (PHASE) and ground

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (bank 1) or 14 (bank 2) and CMP sensor (PHASE) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-680, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace camshaft position sensor (PHASE).

9. CHECK CAMSHAFT (INTAKE)

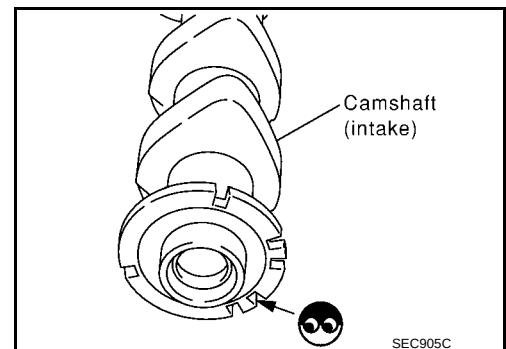
Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

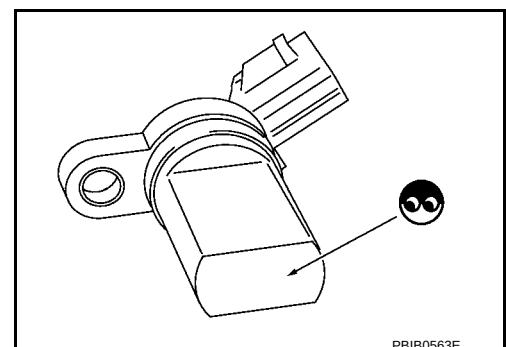
>> **INSPECTION END**

Component Inspection

INFOID:000000005448755

CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



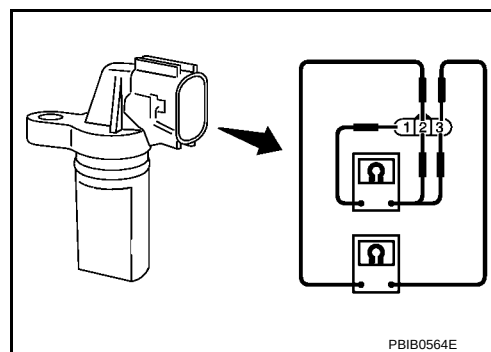
DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

[VQ TYPE 2]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



INFOID:000000005448756

Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

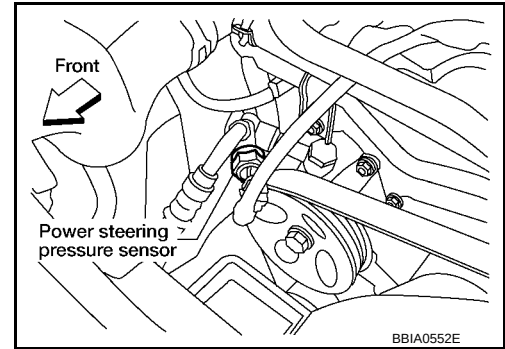
Refer to [EM-71](#).

DTC P0550 PSP SENSOR

Component Description

INFOID:000000005448757

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448758

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned.	OFF
		Steering wheel: Being turned.	ON

On Board Diagnosis Logic

INFOID:000000005448759

The MIL will not light up for this diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-737](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted) - Power steering pressure sensor

DTC Confirmation Procedure

INFOID:000000005448760

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

① WITH CONSULT

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-684, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-684, "Diagnosis Procedure"](#).

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

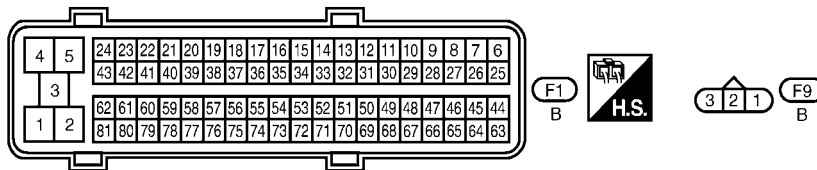
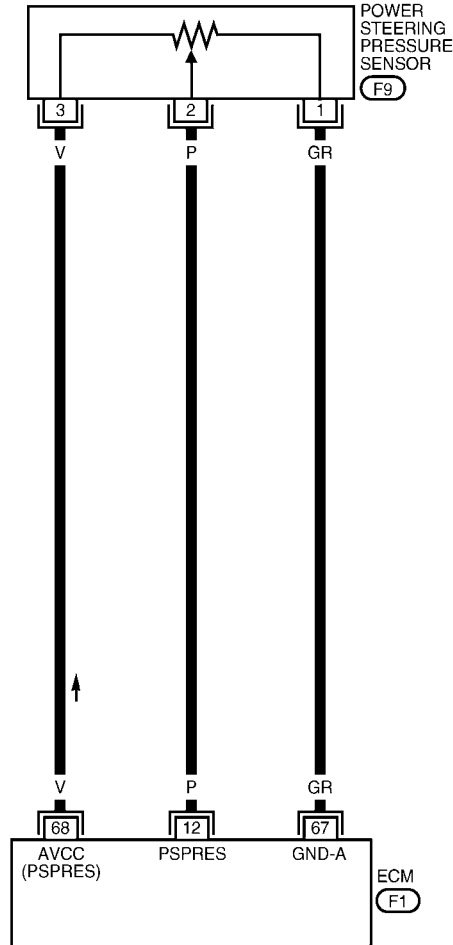
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448761

EC-PS/SEN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

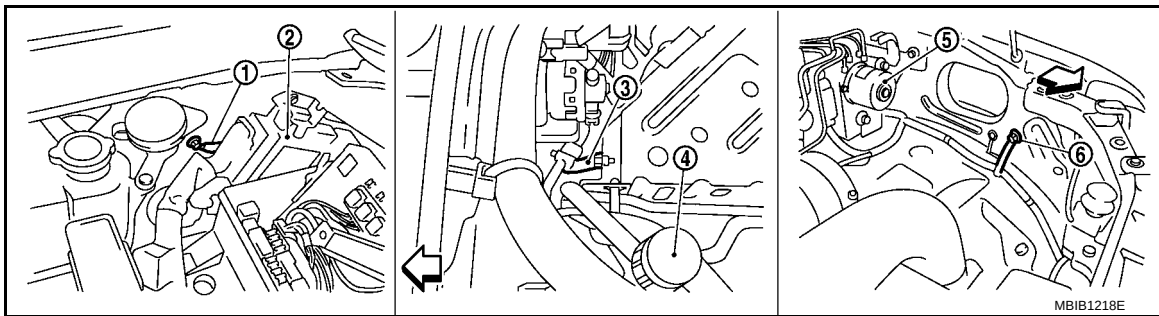
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448762

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

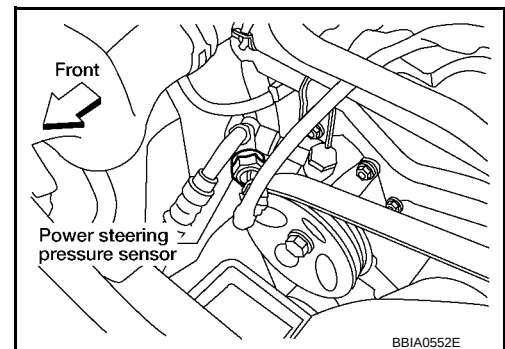
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



DTC P0550 PSP SENSOR

[VQ TYPE 2]

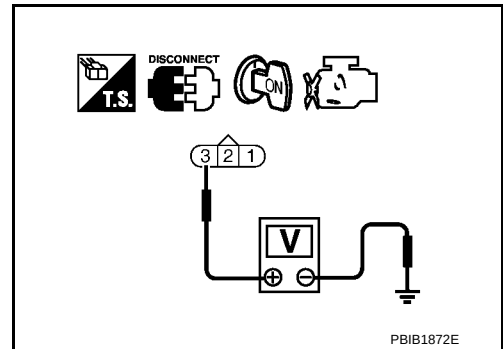
< SERVICE INFORMATION >

3. Check voltage between PSP sensor terminal 3 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK PSP SENSOR

Refer to [EC-685, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace PSP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448763

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.

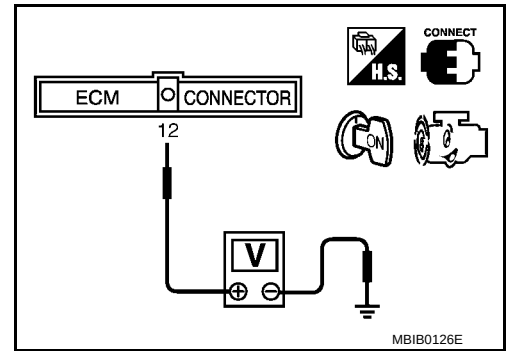
DTC P0550 PSP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned.	0.5 - 4.5V
Steering wheel: Not being turned.	0.4 - 0.8V



INFOID:000000005448764

Removal and Installation

POWER STEERING PRESSURE SENSOR

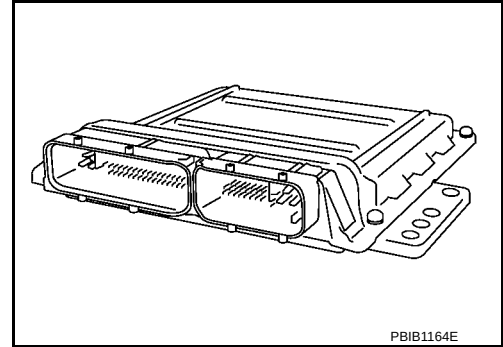
Refer to [PS-40](#).

DTC P0605 ECM

Component Description

INFOID:000000005448765

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



PBIB1164E

On Board Diagnosis Logic

INFOID:000000005448766

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	- ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. - ECM deactivates ASCD operation.

DTC Confirmation Procedure

INFOID:000000005448767

Perform **PROCEDURE FOR MALFUNCTION A** first. If the 1st trip DTC cannot be confirmed, perform **PROCEDURE FOR MALFUNCTION B**. If there is no malfunction on **PROCEDURE FOR MALFUNCTION B**, perform **PROCEDURE FOR MALFUNCTION C**.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

① With CONSULT

- Turn ignition switch ON.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-688. "Diagnosis Procedure"](#).

⊗ Without CONSULT

- Turn ignition switch ON.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
- If 1st trip DTC is detected, go to [EC-688. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

① With CONSULT

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.

< SERVICE INFORMATION >

3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-688, "Diagnosis Procedure"](#).

⊗ Without CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-688, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

Ⓢ With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-688, "Diagnosis Procedure"](#).

⊗ Without CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 to 2 for 32 times.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to [EC-688, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005448768

1. INSPECTION START

Ⓢ With CONSULT

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-687, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P0605 displayed again?

⊗ Without CONSULT

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
Refer to [EC-556, "Malfunction Indicator Lamp \(MIL\)"](#).
3. **Perform DTC Confirmation Procedure.**
See [EC-687, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC 0605 displayed again?

Yes or No

Yes >> GO TO 2.

No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
3. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-566, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

Description

INFOID:000000005448769

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the air fuel ratio (A/F) sensor 1 heater corresponding to the engine operating condition to keep the temperature of air fuel ratio (A/F) sensor 1 element at the specified range.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448770

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	• Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

INFOID:000000005448771

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1) P1051 1051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 heater
P1032 1032 (Bank 1) P1052 1052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is shorted.) • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

INFOID:000000005448772

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT

④ WITH CONSULT

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-693. "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for at least 10 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-693. "Diagnosis Procedure"](#).

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

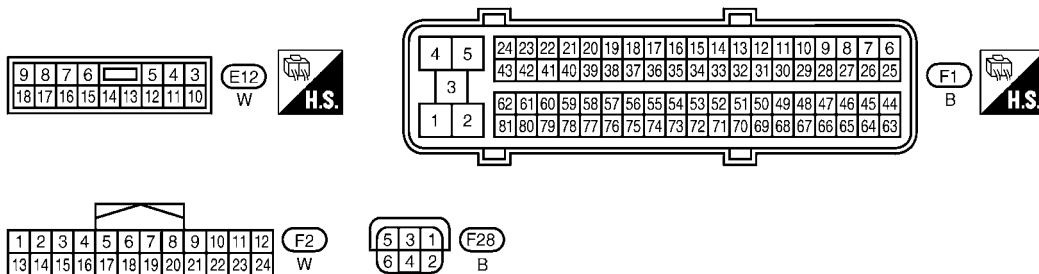
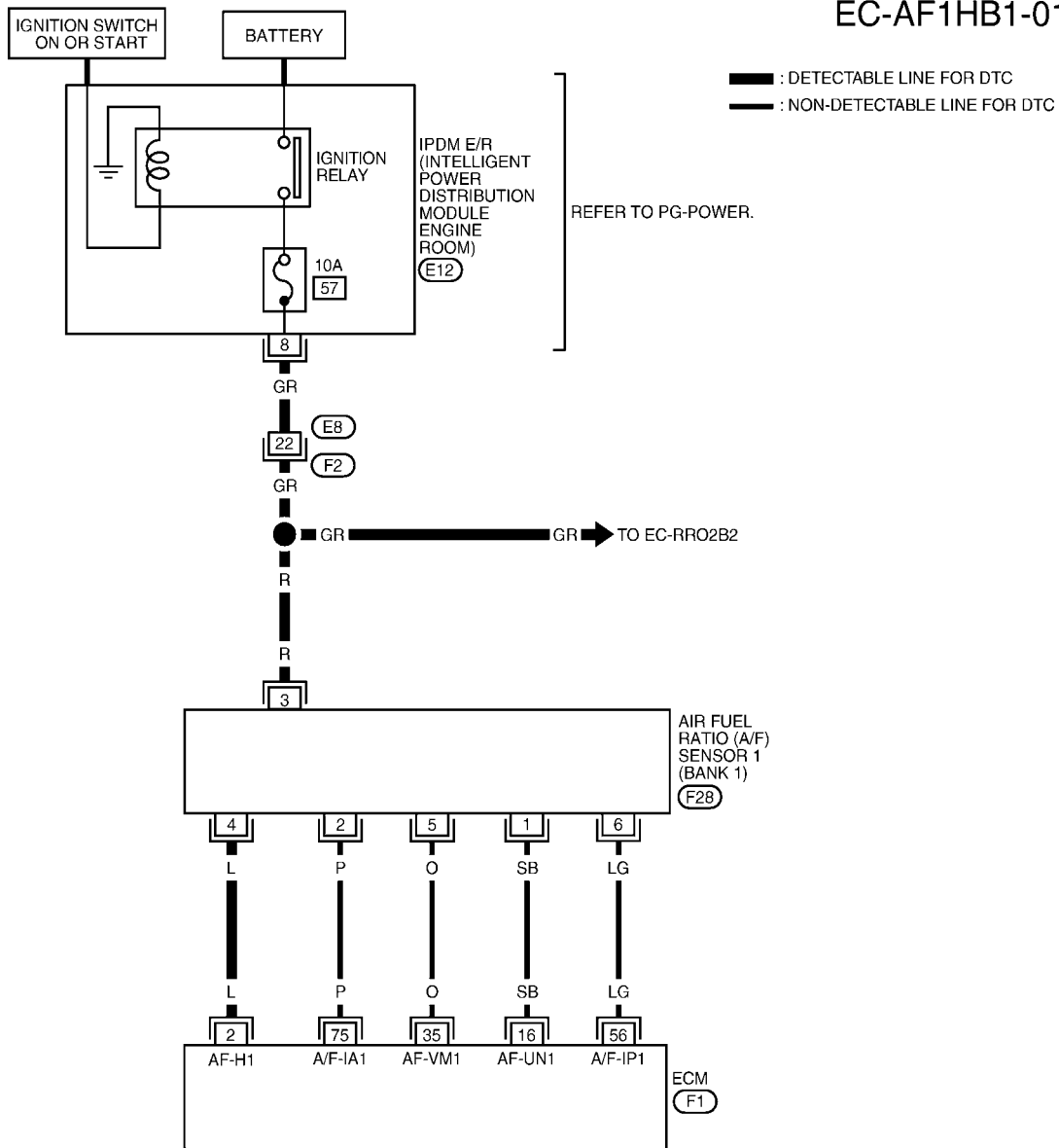
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448773

BANK 1

EC-AF1HB1-01



JMBWA1220GB

Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

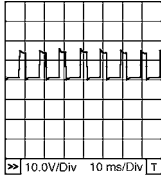
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

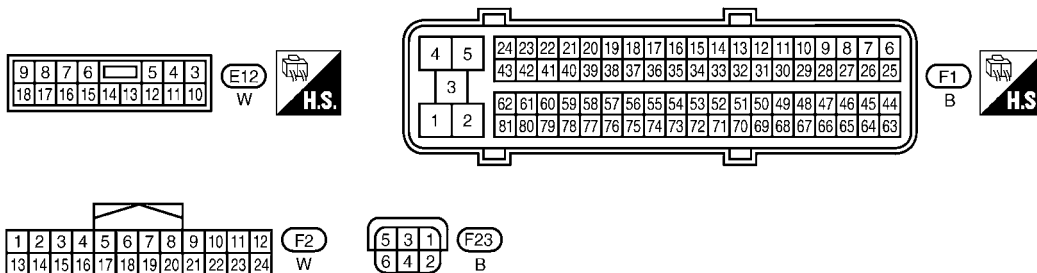
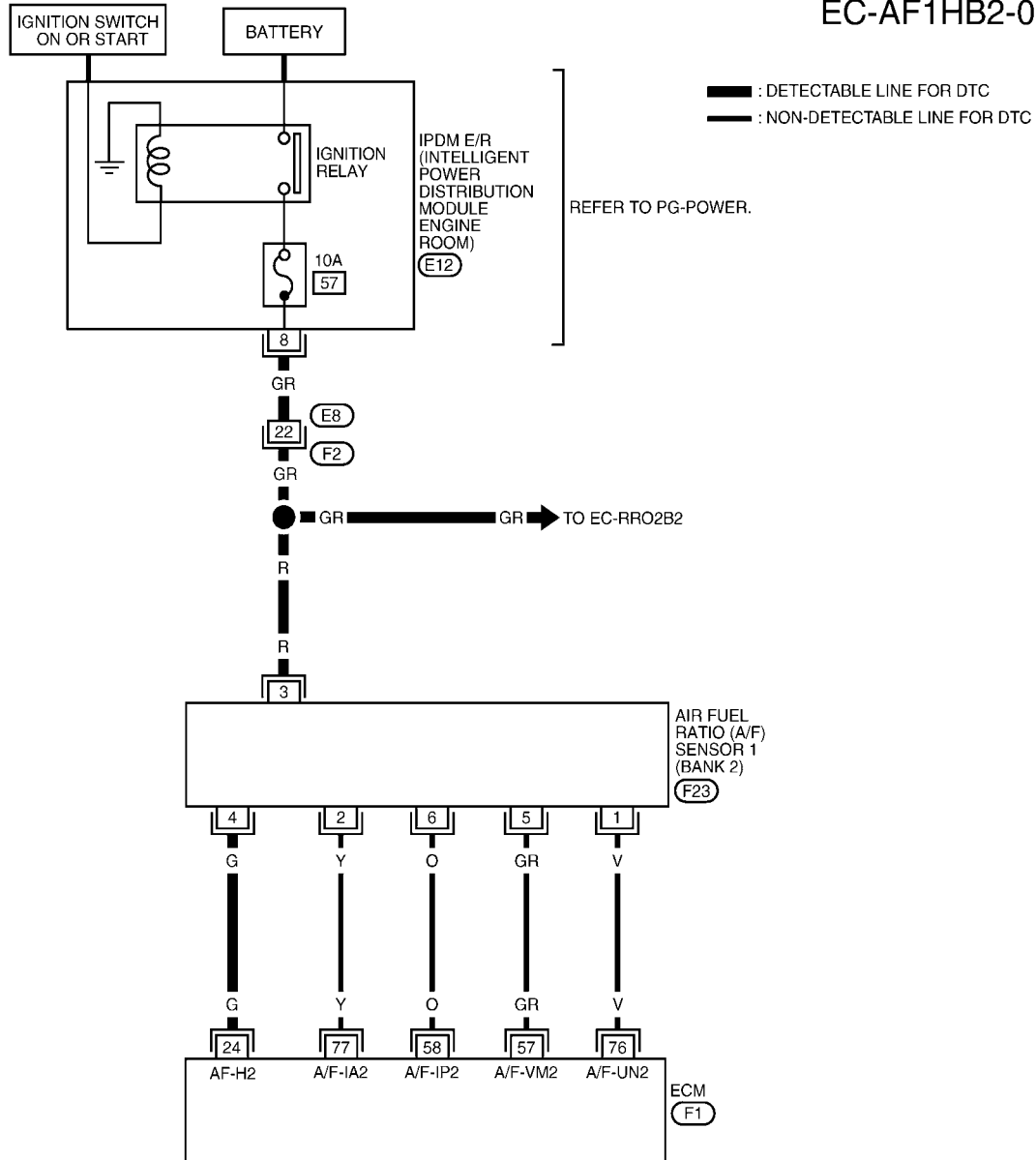
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

BANK 2

EC-AF1HB2-01



JMBWA1221GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

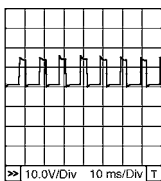
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

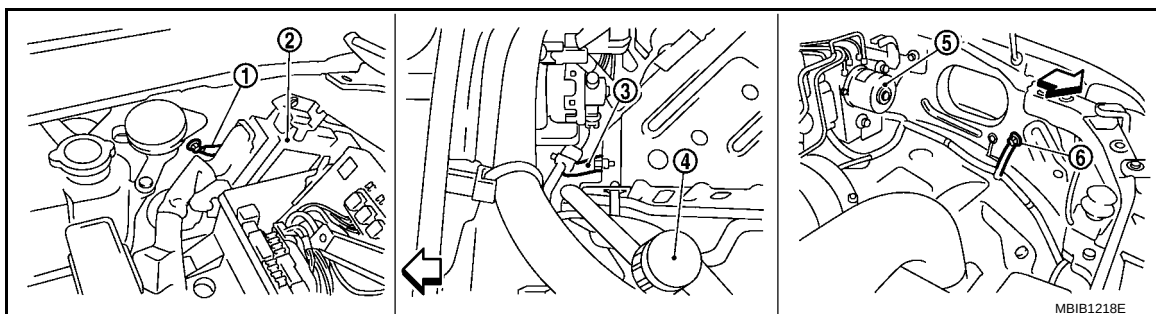
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448774

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

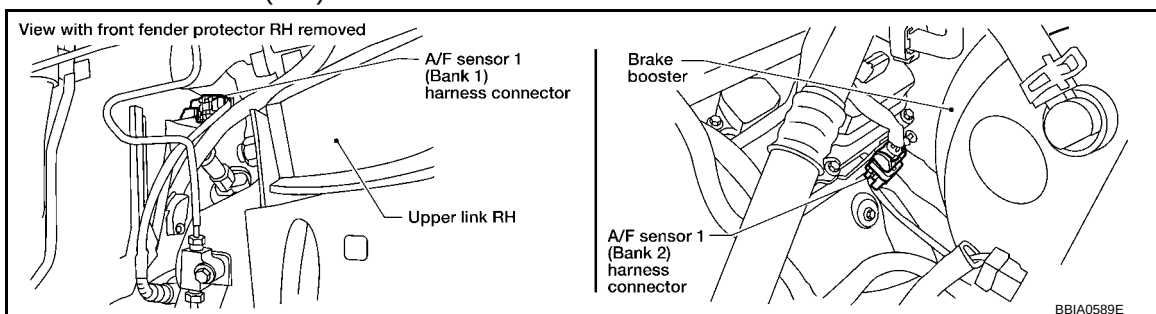
OK or NG

OK >> GO TO 2.

NG >> Repair or Replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

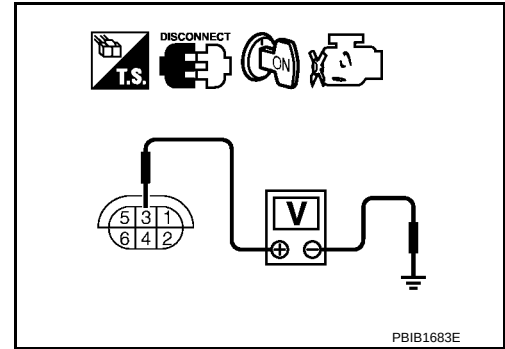
[VQ TYPE 2]

3. Check voltage between air fuel ratio sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 4.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-695. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> GO TO 7.

6.CHECK INTERMITTENT INCIDENT

Perform [EC-620](#).

OK or NG

- OK >> GO TO 7.
NG >> Repair or replace.

7.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

Component Inspection

INFOID:000000005448775

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω [at 25°C (77°F)]

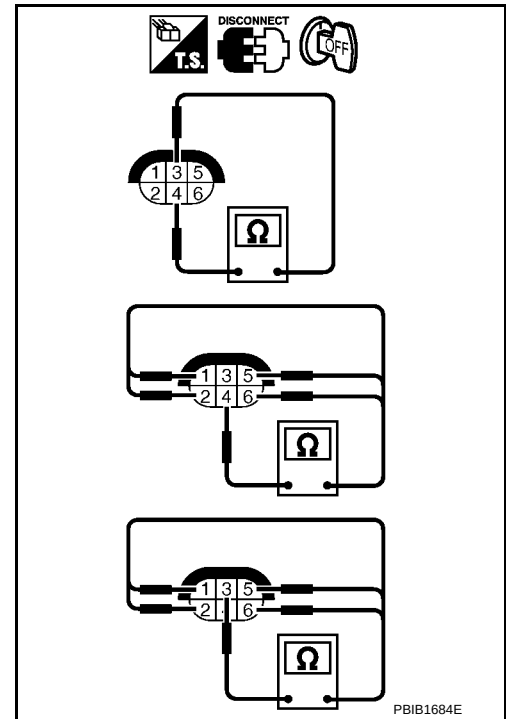
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.



Removal and Installation

INFOID:000000005448776

AIR FUEL RATIO (A/F) SENSOR 1

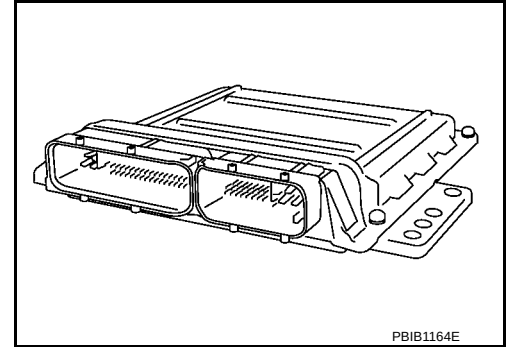
Refer to [EM-23](#).

DTC P1065 ECM POWER SUPPLY

Component Description

INFOID:000000005448777

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



PBIB1164E

On Board Diagnosis Logic

INFOID:000000005448778

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

INFOID:000000005448779

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for 4 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-698. "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat steps 1 to 2 for 4 times.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to [EC-698. "Diagnosis Procedure"](#).

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

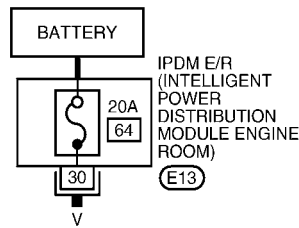
[VQ TYPE 2]

Wiring Diagram

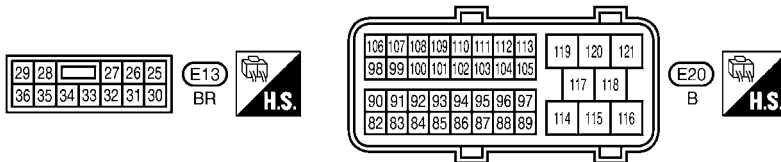
INFOID:000000005448780

EC-ECM/PW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



REFER TO PG-POWER.



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	V	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448781

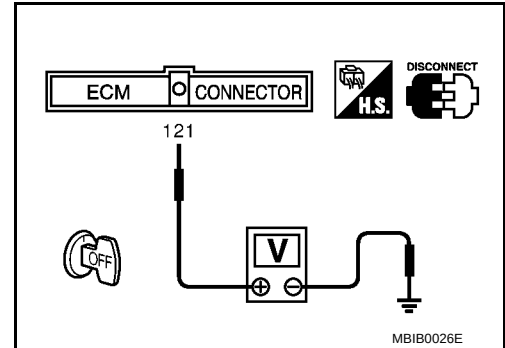
1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2.DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- IPDM E/R harness connector E13
- Harness for open or short between ECM and battery

>> Repair open circuit in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-696, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P1065 displayed again?

Without CONSULT

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
Refer to [EC-556, "Malfunction Indicator Lamp \(MIL\)"](#)
3. **Perform DTC Confirmation Procedure.**
See [EC-696, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC 1065 displayed again?

Yes or No

- Yes >> GO TO 5.
No >> **INSPECTION END**

DTC P1065 ECM POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to [BL-71, "ECM Re-communicating Function"](#).
3. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

A

EC

C

D

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H

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M

N

O

P

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:000000005448782

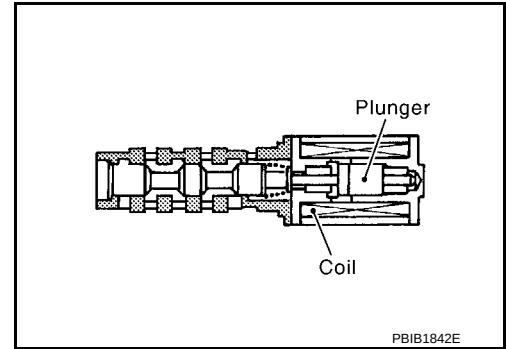
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448783

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

INFOID:000000005448784

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111 (Bank 1)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	- Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) - Intake valve timing control solenoid valve
P1136 1136 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000005448785

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

④ WITH CONSULT

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-704, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-704, "Diagnosis Procedure"](#).

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

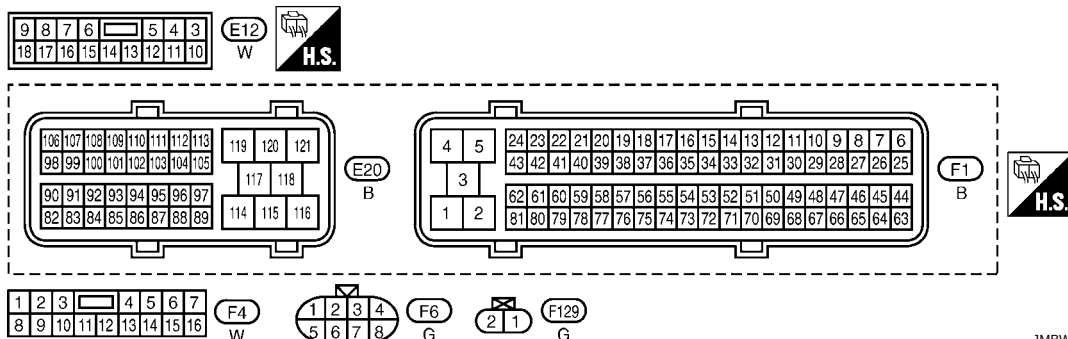
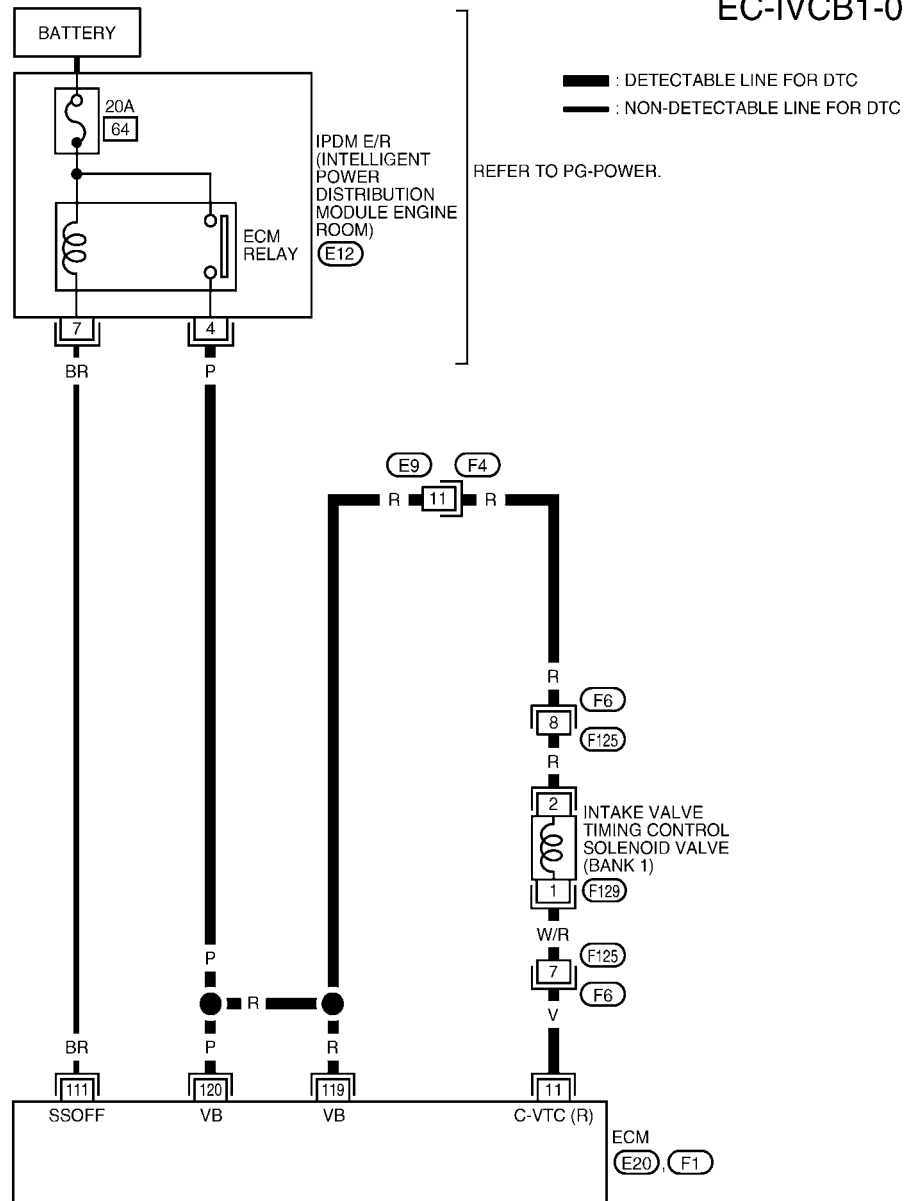
Wiring Diagram

INFOID:000000005448786

BANK 1

EC-IVCB1-01

EC



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

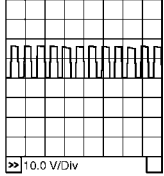
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

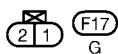
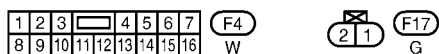
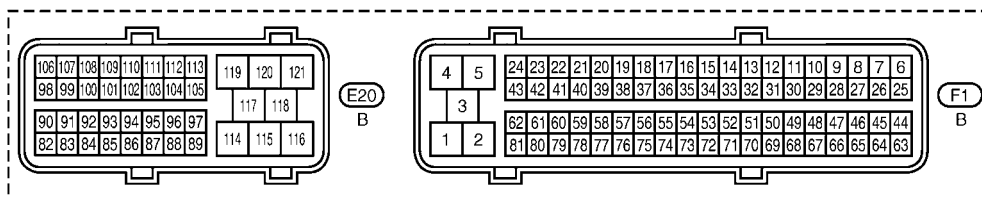
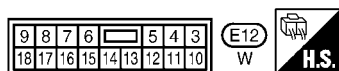
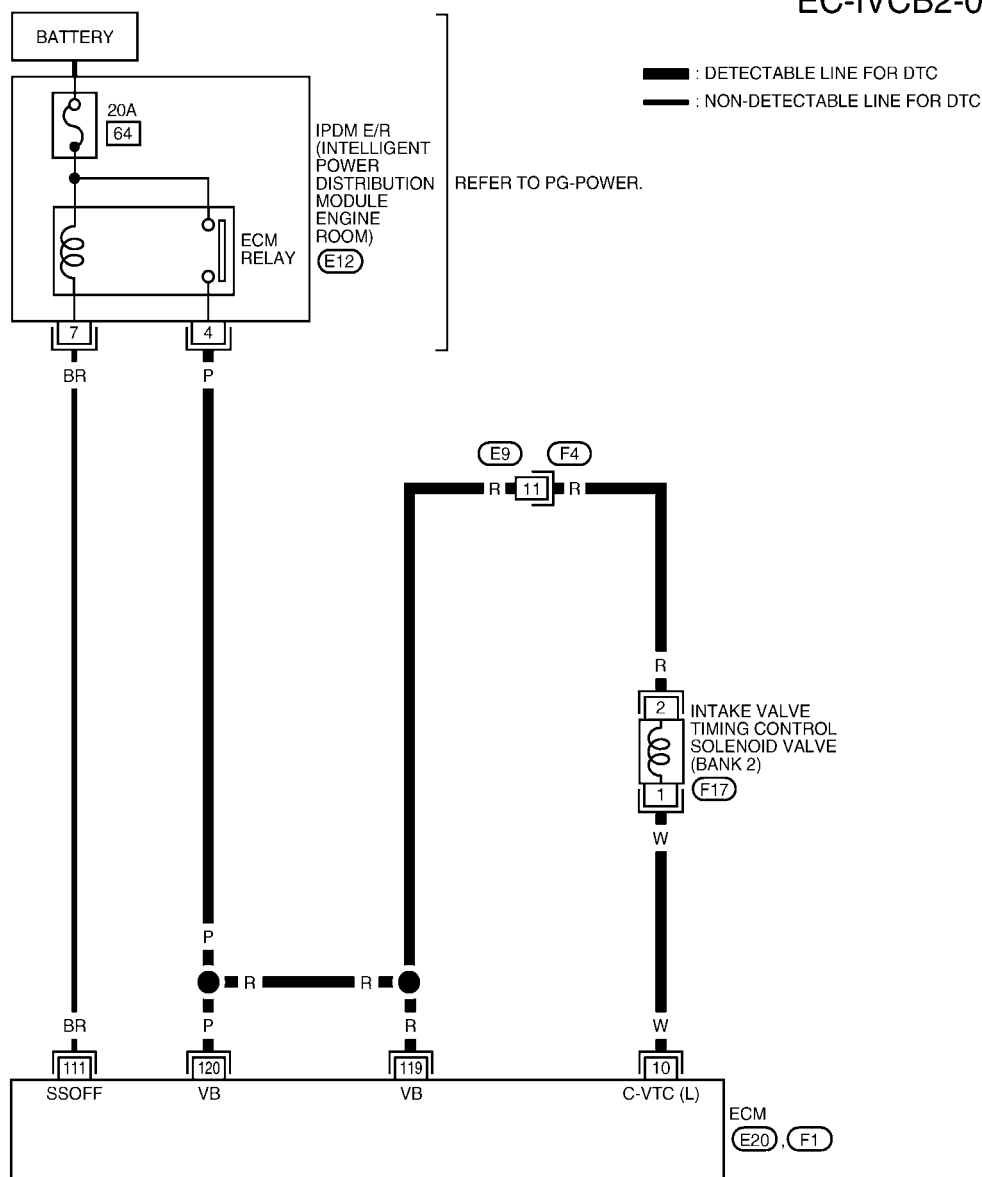
DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

BANK 2

EC-IVCB2-01



JMBWA0433GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

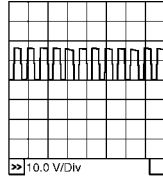
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

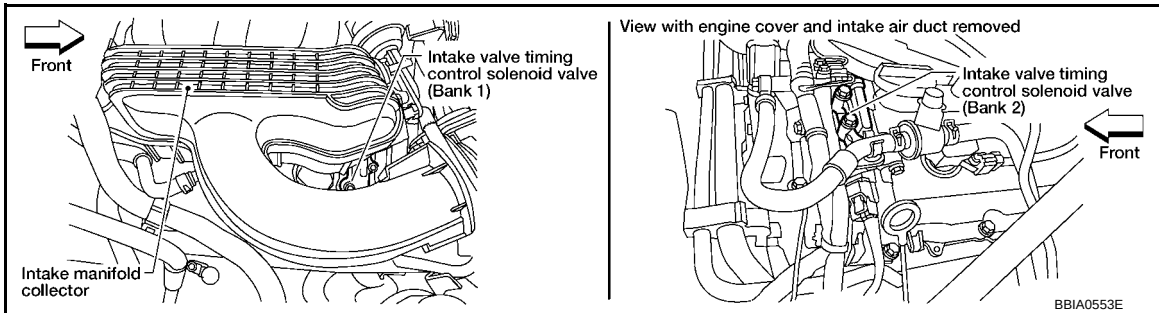
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448787

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve harness connector.

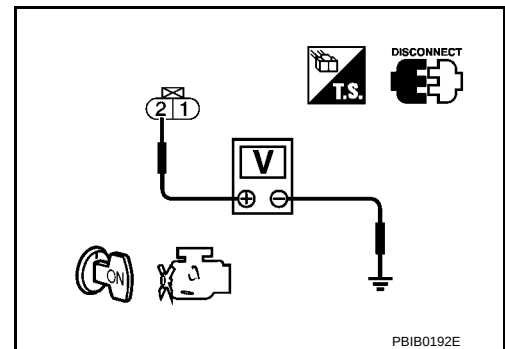


- Turn ignition switch ON.
- Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F6, F125 (bank 1)

DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R
- Harness for open or short between intake valve timing control solenoid valve and ECM

>> Repair harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6 (bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-705, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace intake valve timing control solenoid valve.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448788

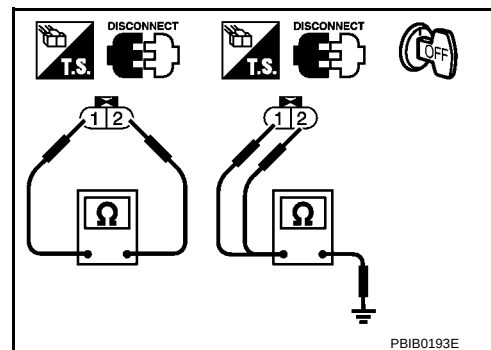
INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.



DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

[VQ TYPE 2]

< SERVICE INFORMATION >

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

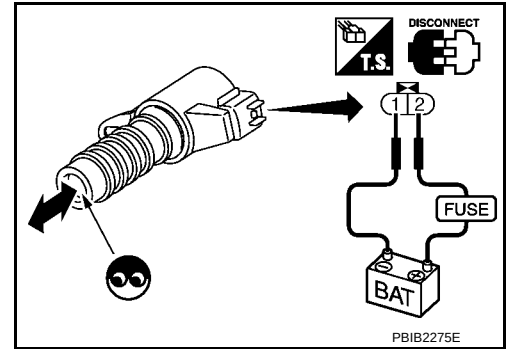
CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:000000005448789

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:000000005448790

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448791

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:000000005448792

NOTE:

- Perform **PROCEDURE FOR MALFUNCTION A AND B** first. If the DTC cannot be confirmed, perform **PROCEDURE FOR MALFUNCTION C**.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P position (A/T) or neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
7. Set shift lever to P position (A/T) or neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to [EC-708, "Diagnosis Procedure"](#).

Without CONSULT

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[VQ TYPE 2]

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P position (A/T) or neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
7. Set shift lever to P position (A/T) or neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
10. If DTC is detected, go to [EC-708, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

⑧ With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P or N position (A/T) or neutral position (M/T).
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to [EC-708, "Diagnosis Procedure"](#).

⊗ Without CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P or N position (A/T) or neutral position (M/T).
4. Start engine and let it idle for 3 seconds.
5. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
6. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
7. If DTC is detected, go to [EC-708, "Diagnosis Procedure"](#).

Diagnosis Procedure

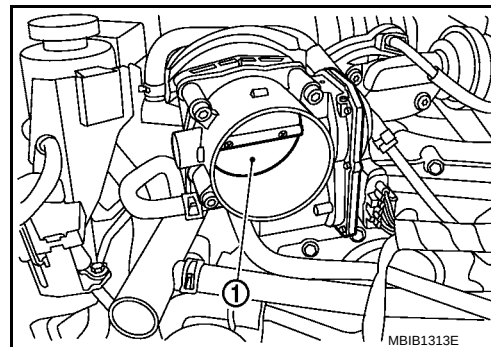
INFOID:000000005448793

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000005448794

NOTE:

If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to [EC-707](#) or [EC-715](#).

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448795

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448796

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V when the engine is running.

WITH CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-711, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to [EC-711, "Diagnosis Procedure"](#).

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

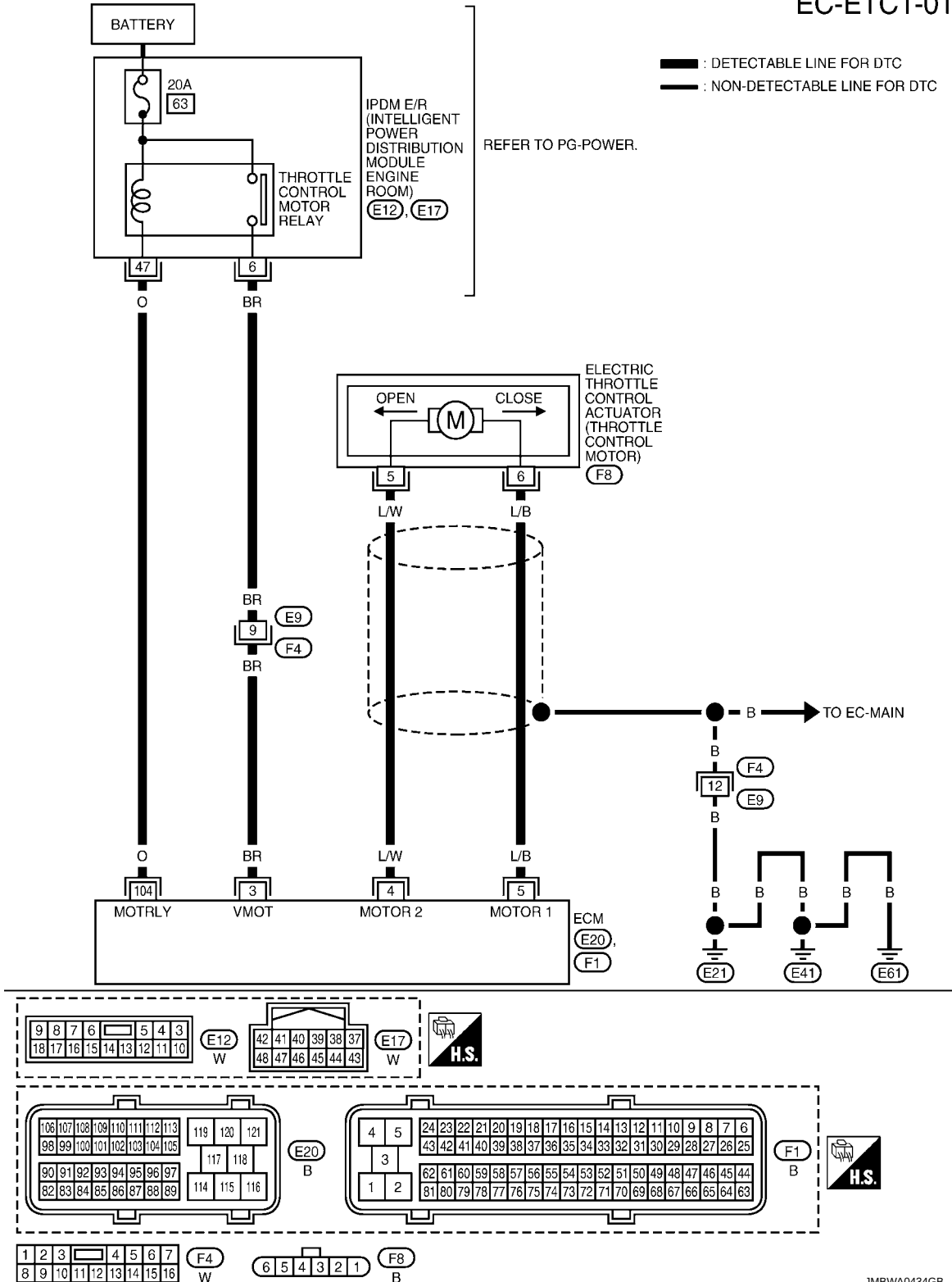
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448797

EC-ETC1-01



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

CAUTION:

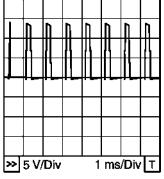
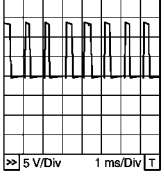
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0434GB

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

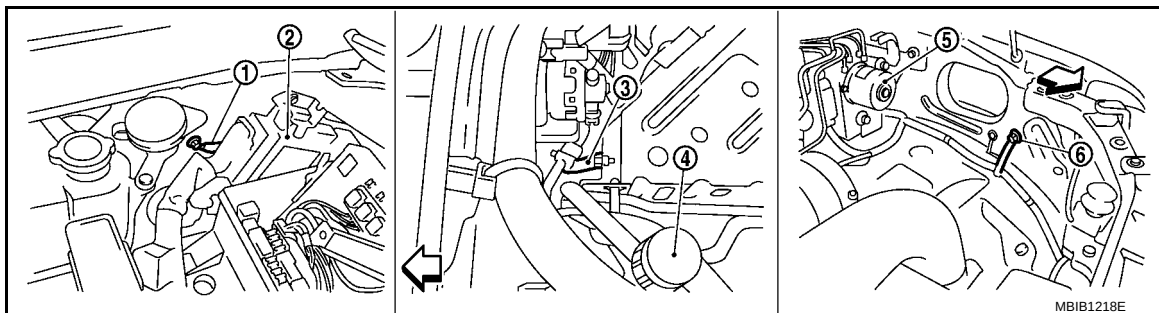
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448798

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C hi-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[VQ TYPE 2]

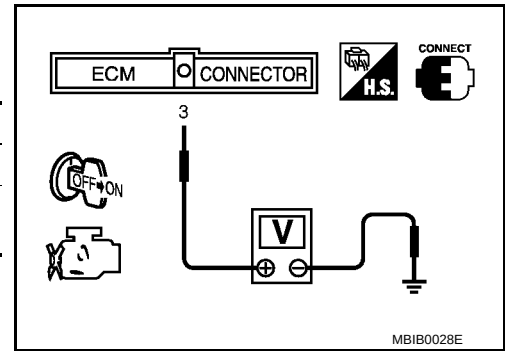
< SERVICE INFORMATION >

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 9.
NG >> GO TO 3.



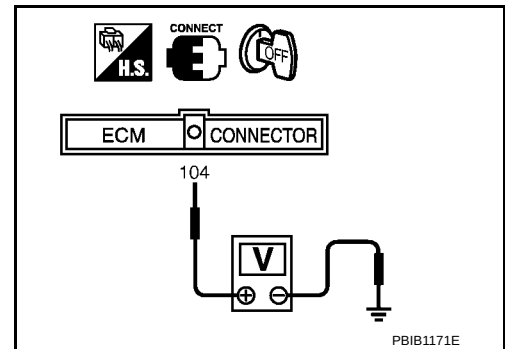
3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 4.



4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 8.
NG >> Replace 20A fuse.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check continuity between ECM terminal 3 and IPDM E/R terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

[VQ TYPE 2]

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

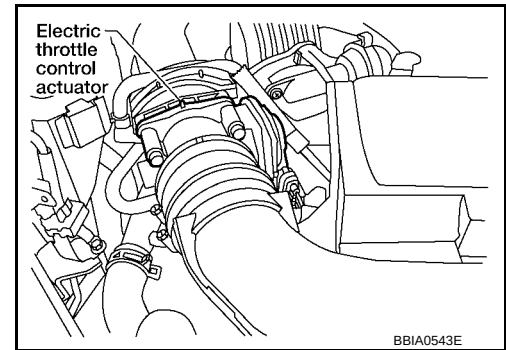
OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connectors.

9.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist



5. Also check harness for short to ground and short to power.

OK or NG

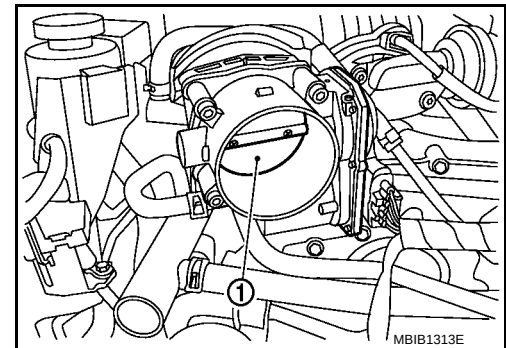
- OK >> GO TO 10.
NG >> Repair or replace.

10.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 11.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



11.CHECK THROTTLE CONTROL MOTOR

Refer to [EC-714, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
NG >> GO TO 13.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> GO TO 13.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[VQ TYPE 2]

< SERVICE INFORMATION >

NG >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

Component Inspection

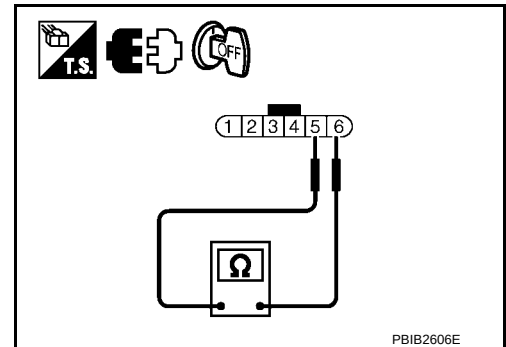
INFOID:000000005448799

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-566, "Idle Air Volume Learning"](#).



INFOID:000000005448800

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:000000005448801

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448802

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:000000005448803

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448804

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

⑧ With CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-718. "Diagnosis Procedure"](#).

⊗ Without CONSULT

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-718. "Diagnosis Procedure"](#).

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VQ TYPE 2]

PROCEDURE FOR DTC P1126

With CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-718, "Diagnosis Procedure"](#).

Without CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to [EC-718, "Diagnosis Procedure"](#).

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

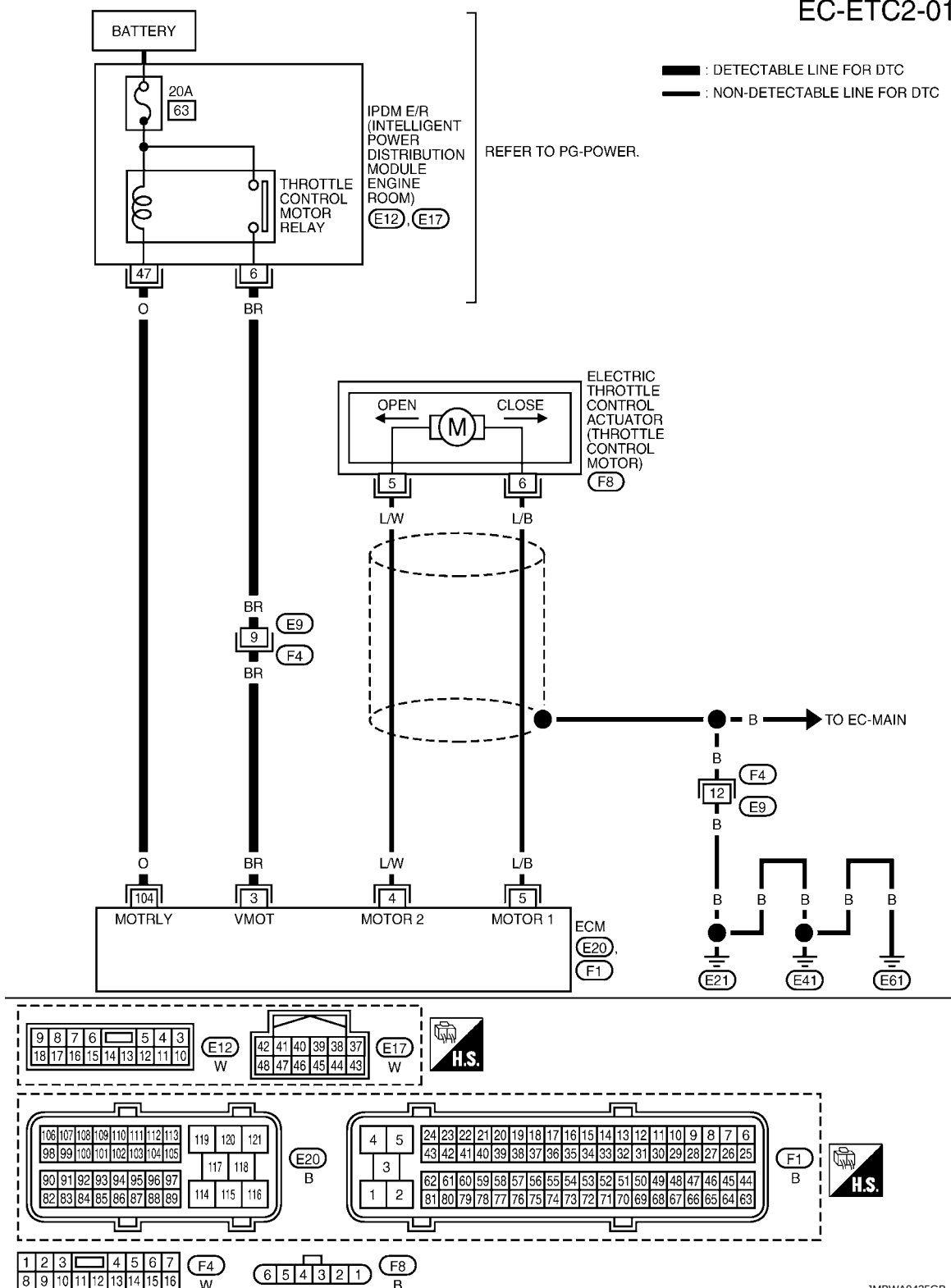
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448805

EC-ETC2-01



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

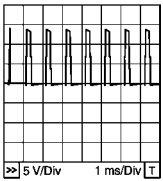
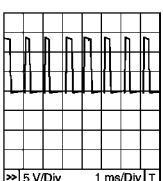
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448806

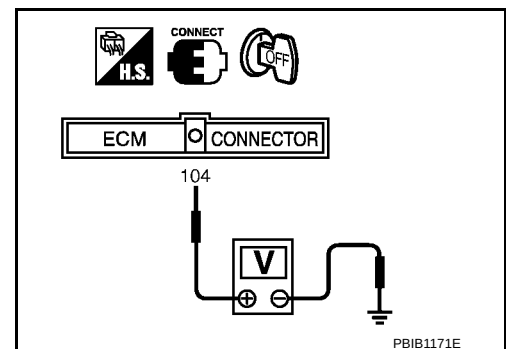
1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Check voltage between ECM terminal 104 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.



2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E17.
- Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUSE

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 7.
NG >> Replace 20A fuse.

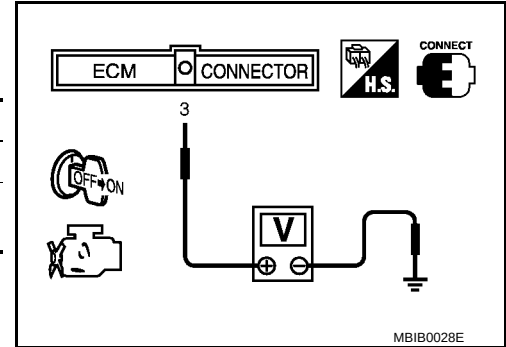
4.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 7.
NG >> GO TO 5.



5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

[VQ TYPE 2]

< SERVICE INFORMATION >

DTC P1128 THROTTLE CONTROL MOTOR

Component Description

INFOID:000000005448807

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

INFOID:000000005448808

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448809

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-722, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to [EC-722, "Diagnosis Procedure"](#).

DTC P1128 THROTTLE CONTROL MOTOR

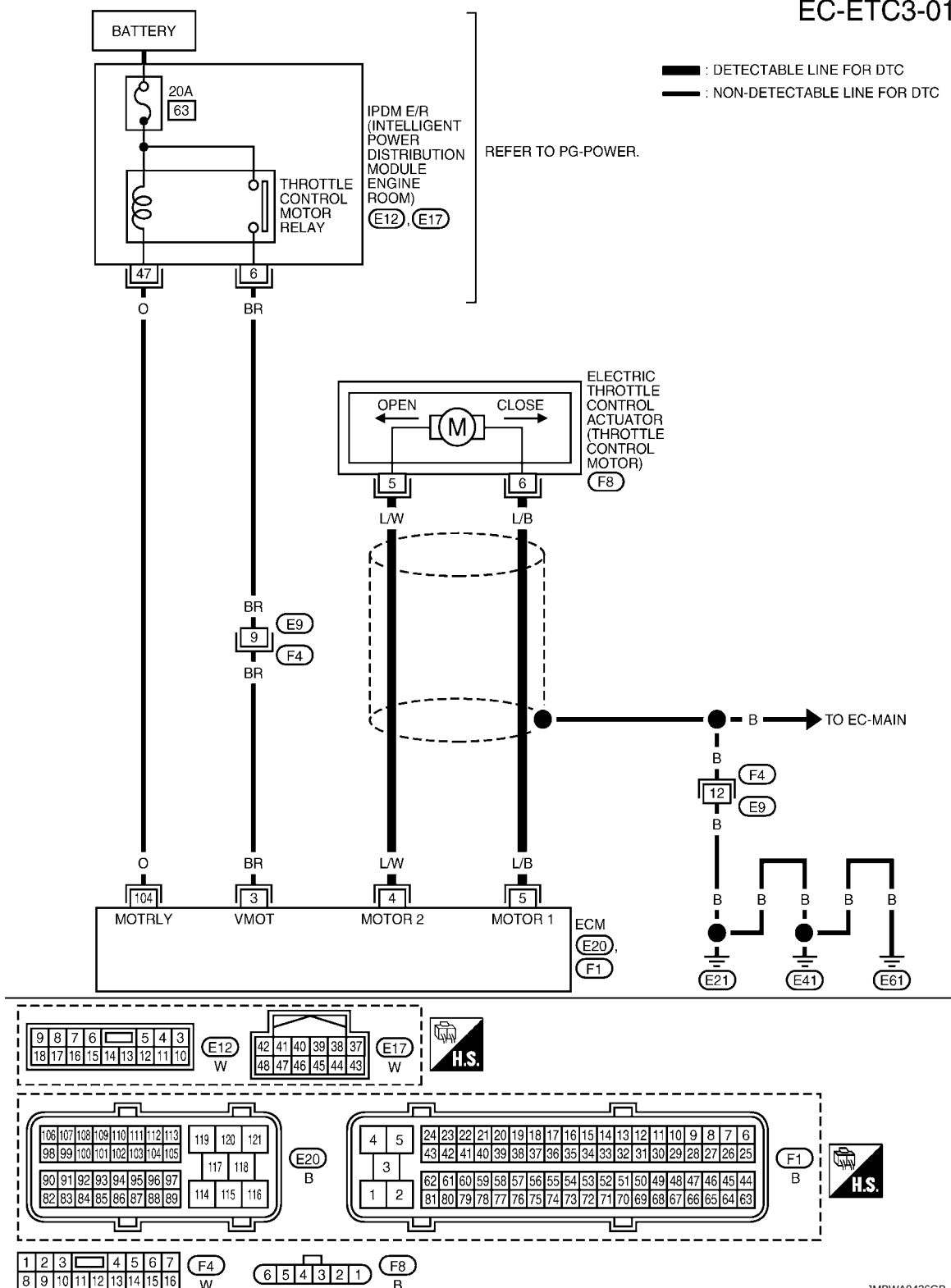
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448810

EC-ETC3-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

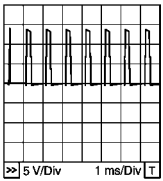
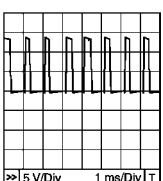
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1128 THROTTLE CONTROL MOTOR

[VQ TYPE 2]

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

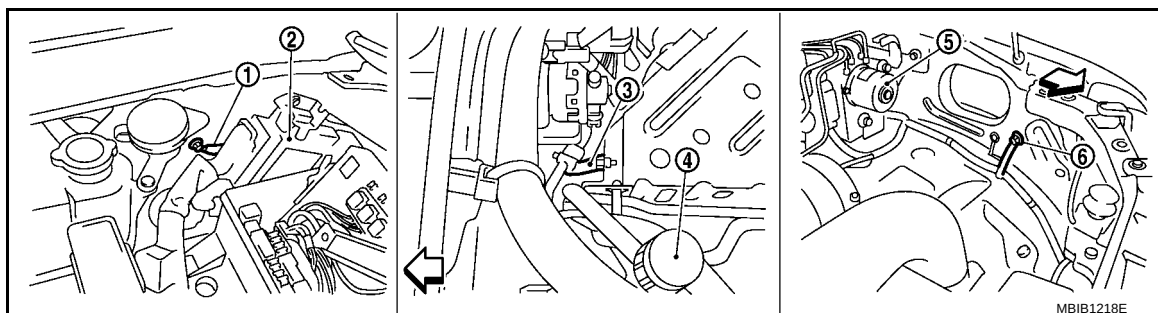
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448811

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



↶ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C hi-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

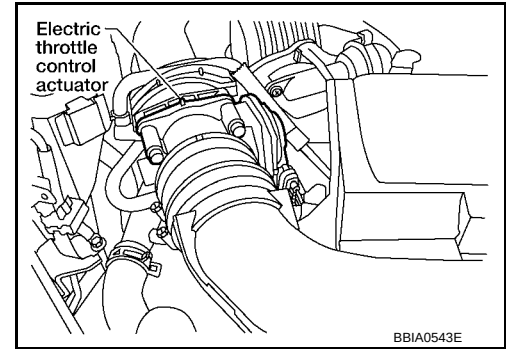
DTC P1128 THROTTLE CONTROL MOTOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist



4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to [EC-723, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

Component Inspection

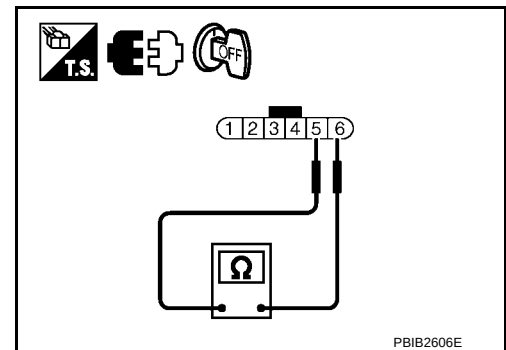
INFOID:000000005448812

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-566, "Idle Air Volume Learning"](#).



Removal and Installation

INFOID:000000005448813

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1217 ENGINE OVER TEMPERATURE

Description

INFOID:000000005448814

SYSTEM DESCRIPTION

NOTE:

If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).

Cooling Fan Control

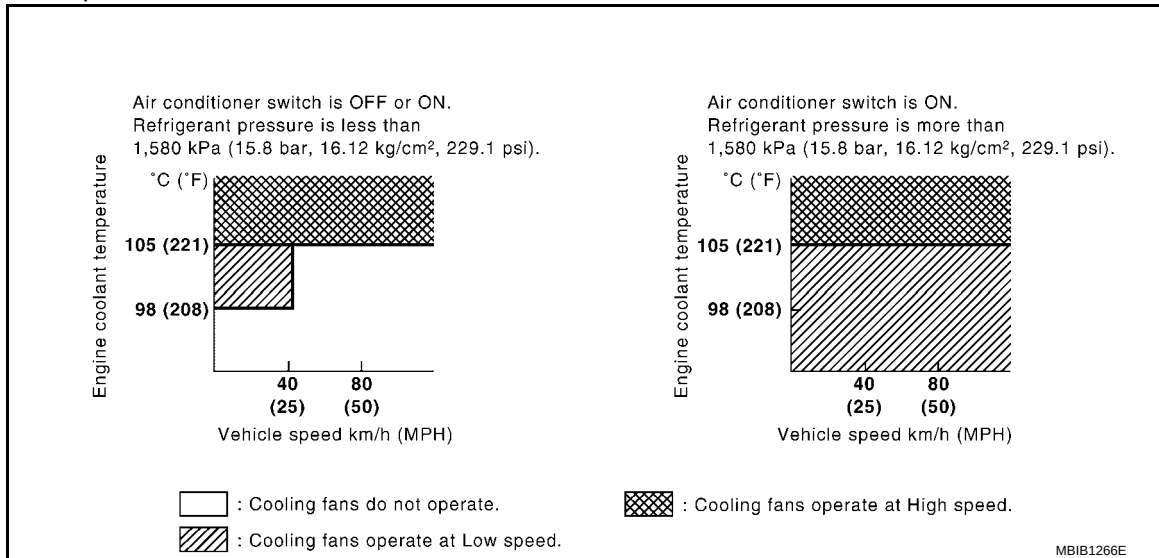
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage* ¹		
Wheel sensor	Vehicle speed* ²		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal* ²		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls the cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 2]

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Low (LOW)	1	3
High (HI)	2	3

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448815

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

On Board Diagnosis Logic

INFOID:000000005448816

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	- Cooling fan does not operate properly (Overheat). - Cooling fan system does not operate properly (Overheat). - Engine coolant level was not added to the system using the proper filling method. - Engine coolant is not within the specified range.	- Harness or connectors (The cooling fan circuit is open or shorted.) - IPDM E/R - Cooling fan - Cooling fan (Crankshaft driven) - Radiator hose - Radiator - Radiator cap - Reservoir tank - Reservoir tank cap - Water pump - Thermostat For more information, refer to EC-731, "Main 12 Causes of Overheating".

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [MA-28, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [MA-32, "Changing Engine Oil"](#).

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to [MA-27, "Engine Coolant Mixture Ratio"](#).
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

INFOID:000000005448817

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove a radiator cap and/or a reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.

DTC P1217 ENGINE OVER TEMPERATURE

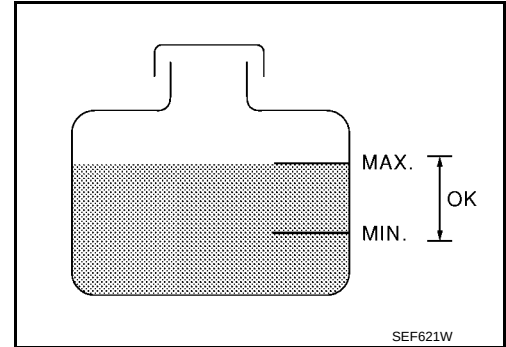
< SERVICE INFORMATION >

[VQ TYPE 2]

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

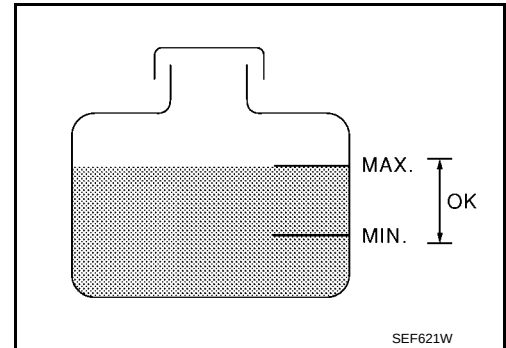
WITH CONSULT

1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-728, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-728, "Diagnosis Procedure"](#).
3. Turn ignition switch ON.
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
5. If the results are NG, go to [EC-728, "Diagnosis Procedure"](#).



WITHOUT CONSULT

1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-728, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-728, "Diagnosis Procedure"](#).
3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PG-28, "Auto Active Test"](#).
4. If NG, go to [EC-728, "Diagnosis Procedure"](#).



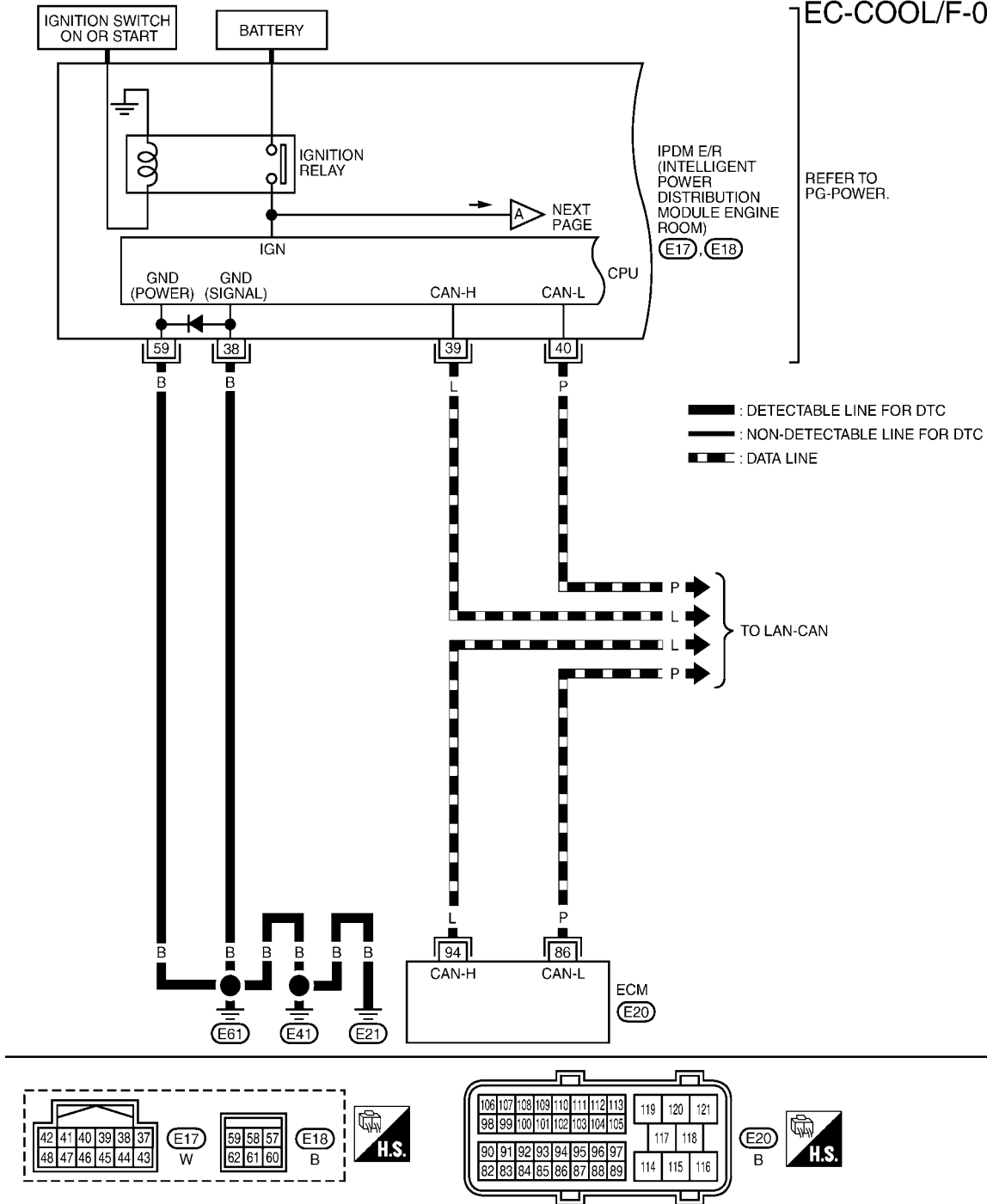
DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448818



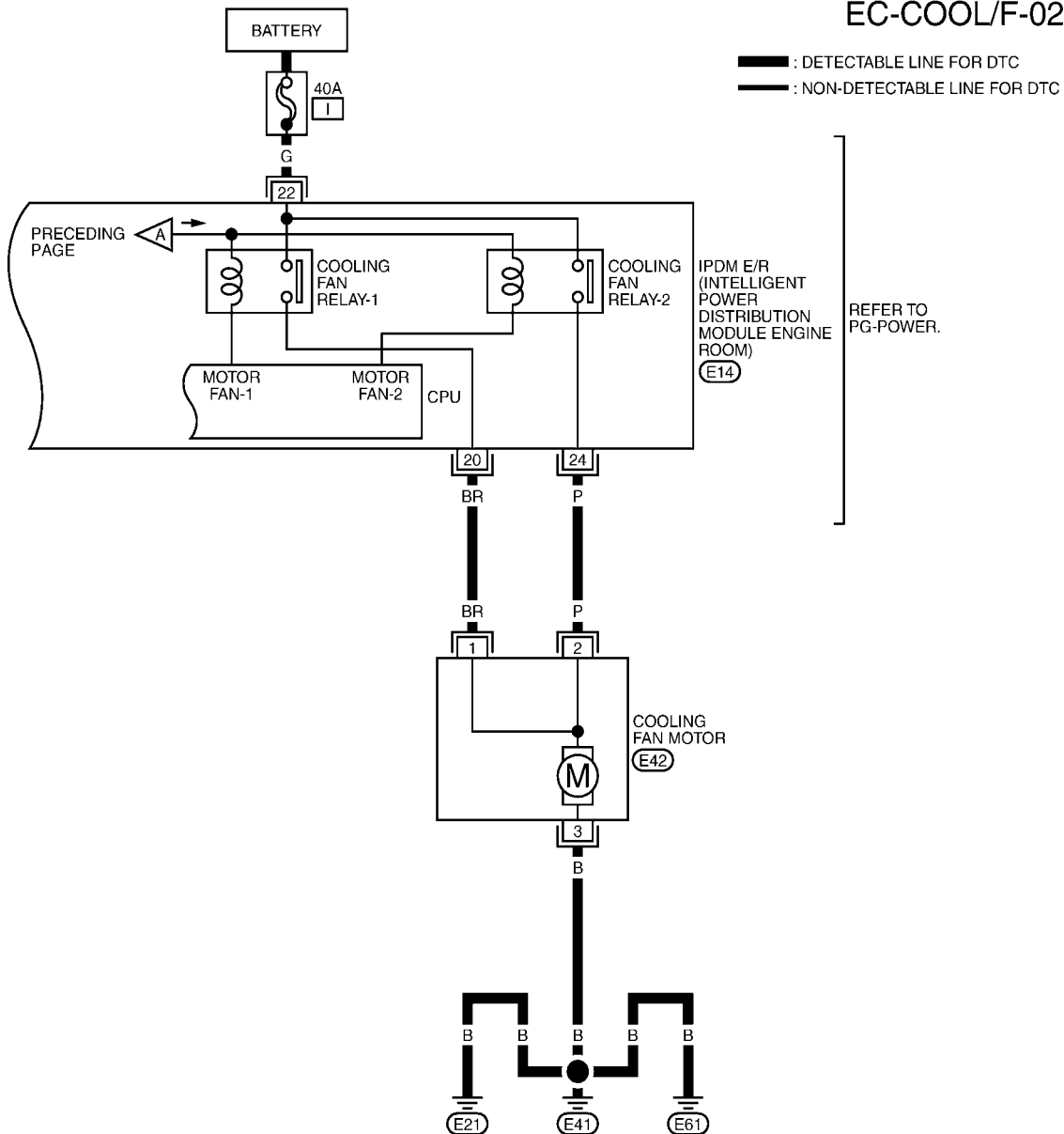
JMBWA0437GB

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-COOL/F-02



(E14)
W



3 1 2

(E42)
GR

Diagnosis Procedure

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

OK or NG

OK (With CONSULT)>>GO TO 2.

JMBWA0438GB

INFOID:000000005448819

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 2]

< SERVICE INFORMATION >

OK (Without CONSULT)>>GO TO 3.

NG >> Check cooling fan (crankshaft driven). Refer to [CO-21, "Component \(Crankshaft Driven Type\)"](#).

2.CHECK COOLING FAN OPERATION

With CONSULT

1. Start engine and let it idle.
2. Select "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan operate at each speed (LOW/HI).

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Refer to "PROCEDURE A".)

3.CHECK COOLING FAN OPERATION

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to [PG-28, "Auto Active Test"](#).
2. Make sure that cooling fan operate at each speed (Low/High).

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Refer to "PROCEDURE A".)

4.CHECK COOLING SYSTEM FOR LEAK

Refer to [CO-10, "Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Check the following for leak. Refer to [CO-10, "Inspection"](#).

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

5.CHECK RESERVOIR TANK CAP

Refer to [CO-13, "Removal and Installation"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace reservoir tank cap.

6.CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to [CO-28](#).
- Engine coolant temperature sensor. Refer to [EC-647, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning component.

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-731, "Main 12 Causes of Overheating"](#).

>> INSPECTION END

PROCEDURE A

1.CHECK COOLILNG FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E14.

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 2]

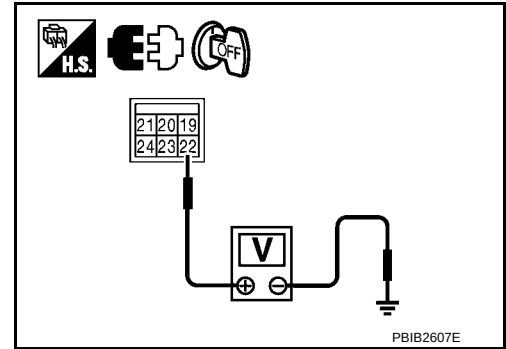
< SERVICE INFORMATION >

3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- 40A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors E17, E18.
2. Check harness continuity between IPDM E/R terminal 38, 59 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

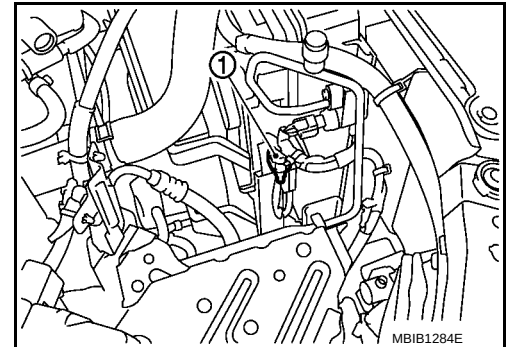
1. Disconnect cooling fan motor harness connector (1).
2. Check harness continuity between the following;
cooling fan motor terminal 1 and IPDM E/R terminal 20,
cooling fan motor terminal 2 and IPDM E/R terminal 24.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



5. CHECK COOLING FAN MOTOR GROUND CIRCUIT FOR OPEN OR SHORT

1. Check harness continuity between cooling fan motor terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK COOLING FAN MOTOR

Refer to [EC-731, "Component Inspection"](#).

OK or NG

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 2]

< SERVICE INFORMATION >

- OK >> GO TO 7.
NG >> Replace cooling fan motors.

7.CHECK INTERMITTENT INCIDENT

Perform [EC-620](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-26](#).
NG >> Repair or replace harness or connector.

Main 12 Causes of Overheating

INFOID:000000005448820

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	- Blocked radiator - Blocked condenser - Blocked radiator grille - Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-27
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-28
	4	• Reservoir tank cap	• Pressure tester	59 - 117.8 kPa (0.59 - 1.18 bar, 0.6 - 1.2 kg/cm ² , 9 - 17 psi) (Limit)	CO-13
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-10
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-28
ON*1	7	• Cooling fan	• CONSULT	Operating	See trouble diagnosis for DTC P1217 (EC-724).
ON*2	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See CO-21 .
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	MA-28
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	MA-28
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-89
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-104

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to [CO-7](#).

Component Inspection

INFOID:000000005448821

COOLING FAN MOTOR

DTC P1217 ENGINE OVER TEMPERATURE

[VQ TYPE 2]

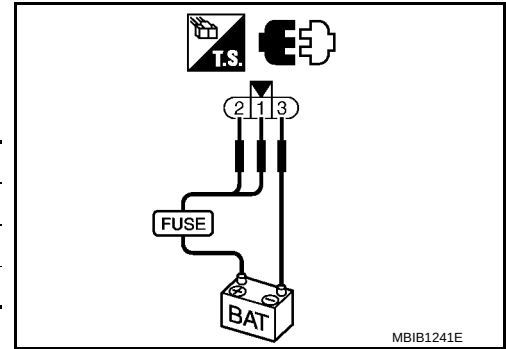
< SERVICE INFORMATION >

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Low	1	3
High	2	3

Cooling fan motor should operate.

If NG, replace cooling fan motor.



DTC P1225 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

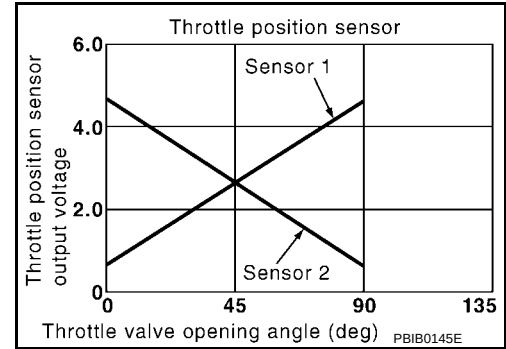
DTC P1225 TP SENSOR

Component Description

INFOID:000000005448822

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005448823

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005448824

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-733, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to [EC-733, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005448825

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

DTC P1225 TP SENSOR

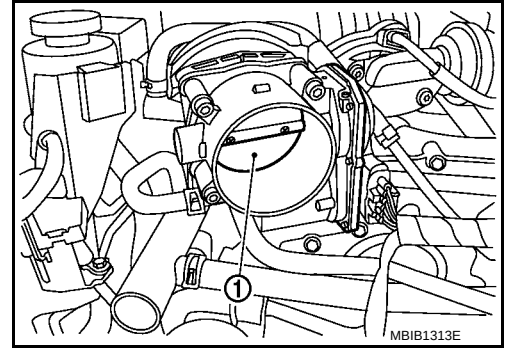
[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005448826

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

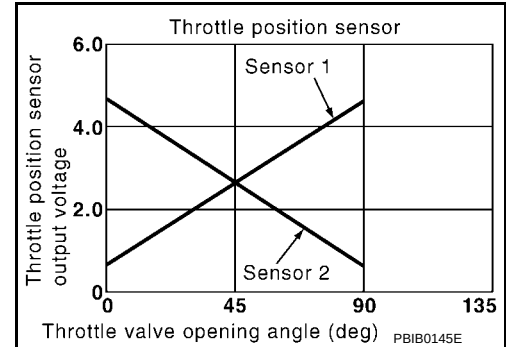
DTC P1226 TP SENSOR

Component Description

INFOID:000000005448827

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

INFOID:000000005448828

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:000000005448829

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

① WITH CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-735, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If 1st trip DTC is detected, go to [EC-735, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000005448830

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

DTC P1226 TP SENSOR

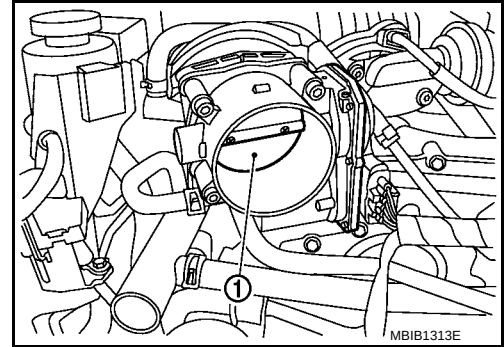
[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

- OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566. "Idle Air Volume Learning"](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000005448831

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1229 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:000000005448832

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • EVAP control system pressure sensor • Power steering pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:000000005448833

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-741, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-741, "Diagnosis Procedure"](#).

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

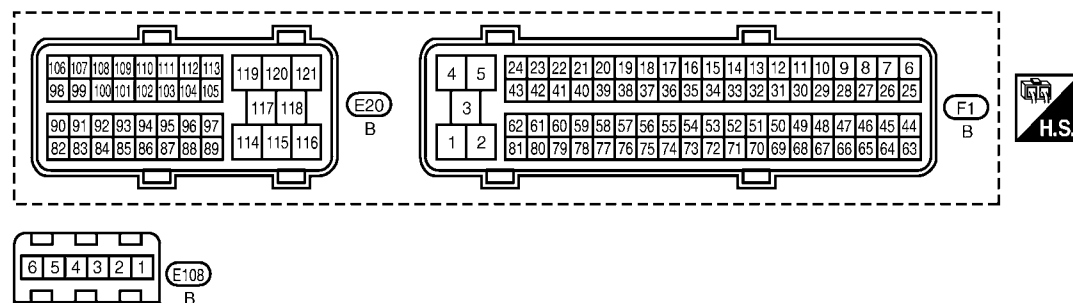
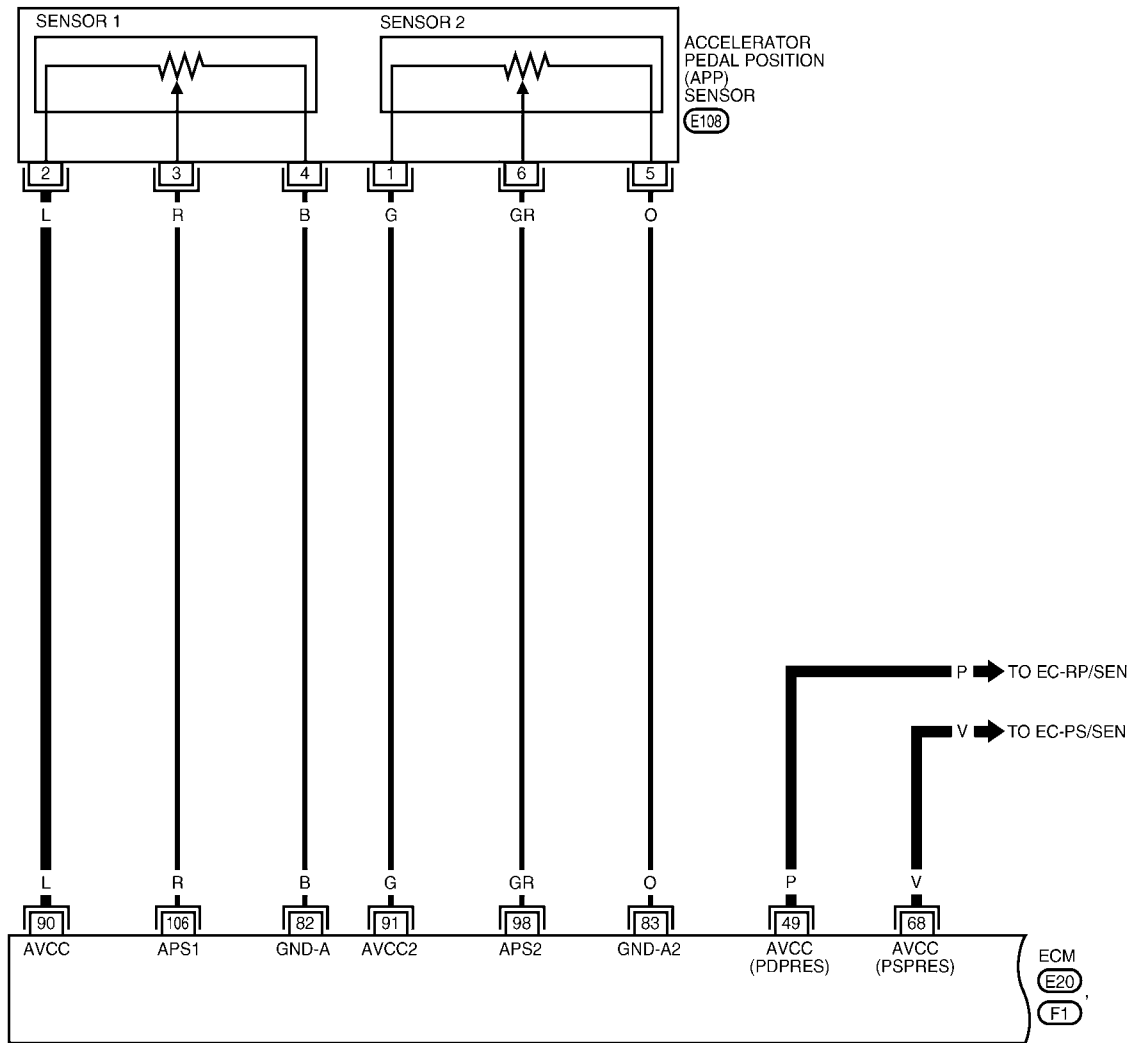
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448834

EC-SEN/PW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1307E

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
68	V	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

A

EC

C

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O

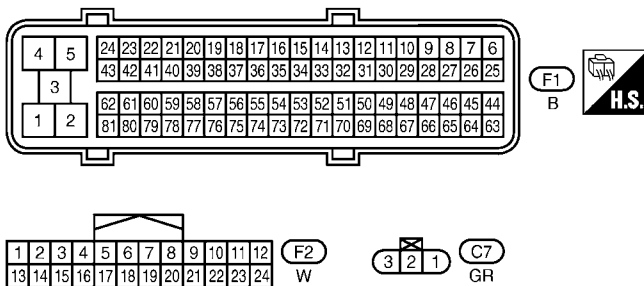
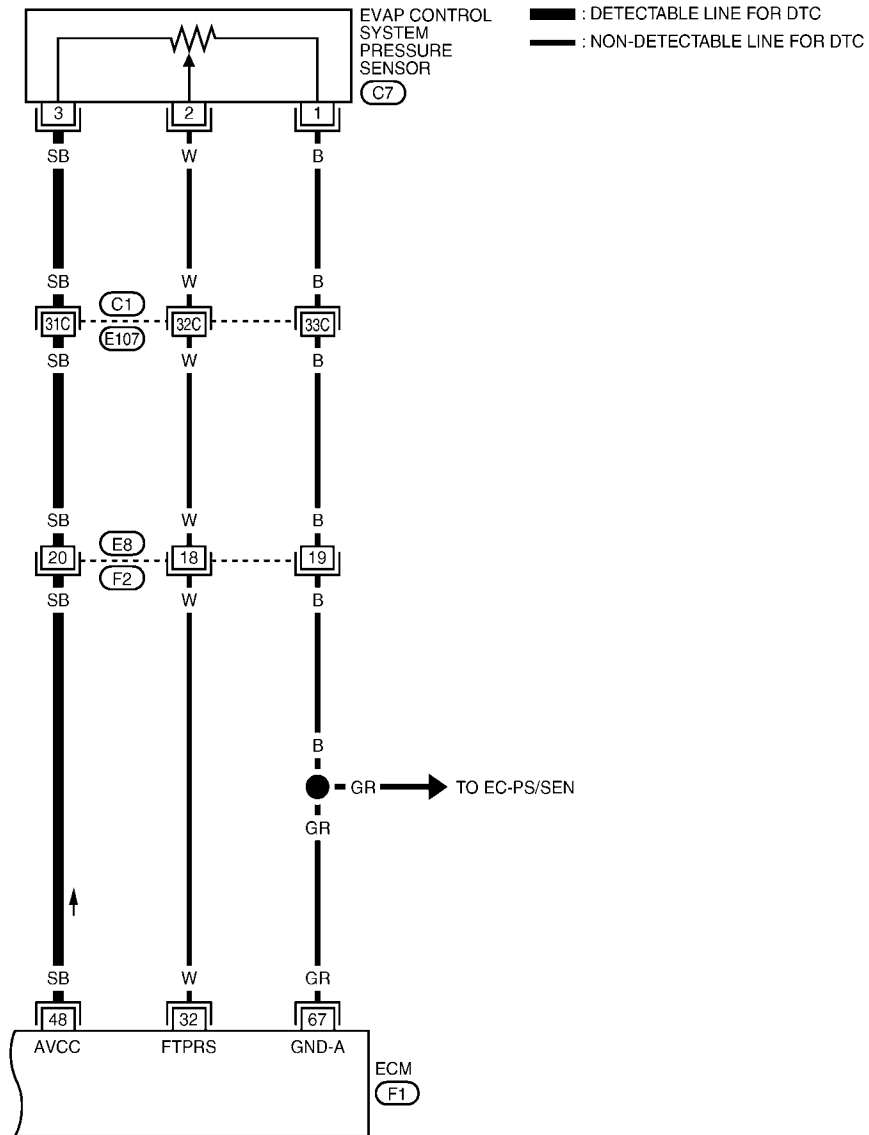
P

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-SEN/PW-02



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0439GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1229 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[VQ TYPE 2]

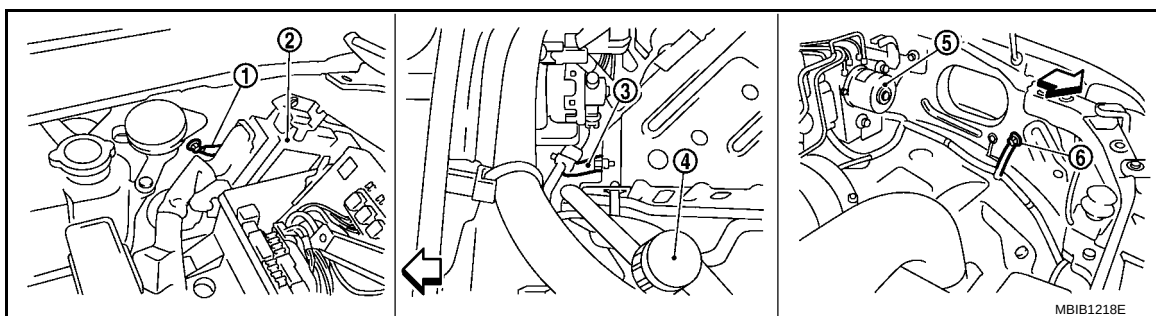
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	W	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448835

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground three screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

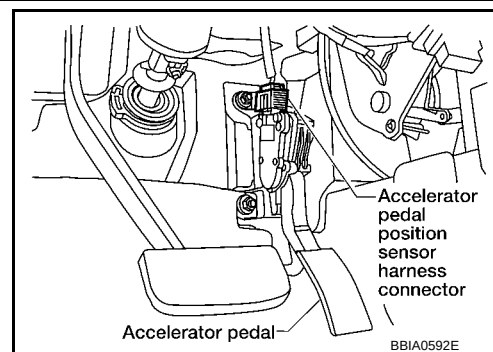
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



DTC P1229 SENSOR POWER SUPPLY

[VQ TYPE 2]

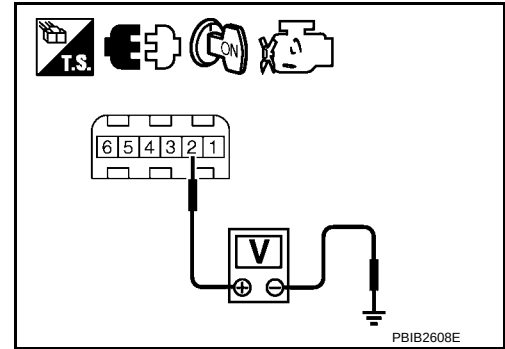
< SERVICE INFORMATION >

3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 6.
NG >> GO TO 3.



3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-738
48	EVAP control system pressure sensor terminal 3	EC-738
49	Refrigerant pressure sensor terminal 3	EC-895
68	PSP sensor terminal 3	EC-683

OK or NG

- OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

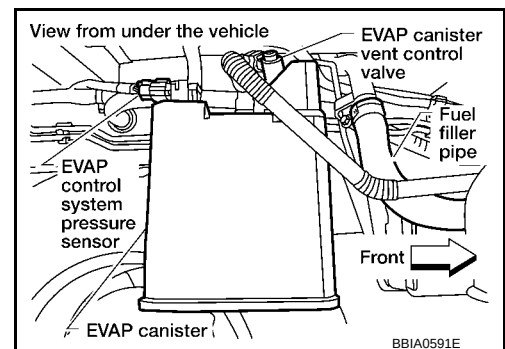
- Refrigerant pressure sensor (Refer to [EC-896, "Diagnosis Procedure"](#).)
- Power steering pressure sensor (Refer to [EC-685, "Component Inspection"](#).)

OK or NG

- OK >> GO TO 5.
NG >> Replace malfunctioning component.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.



2. Install a vacuum pump to EVAP control system pressure sensor.

DTC P1229 SENSOR POWER SUPPLY

[VQ TYPE 2]

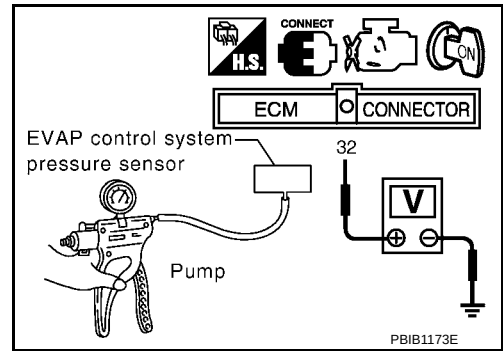
< SERVICE INFORMATION >

- Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mbar, mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-267, -200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-933 mbar, -700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (1013 mbar, 760 mmHg, 29.92 inHg).



OK or NG

- OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

6.CHECK APP SENSOR

Refer to [EC-808, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
- Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
- Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 2]

< SERVICE INFORMATION >

DTC P1271, P1281 A/F SENSOR 1

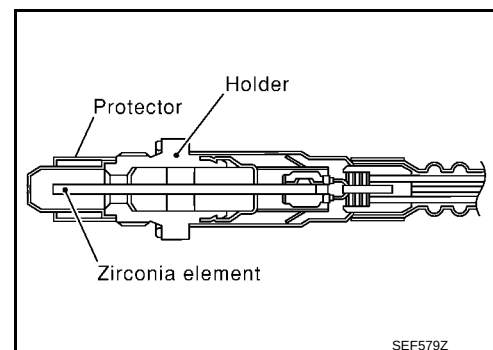
Component Description

INFOID:000000005448836

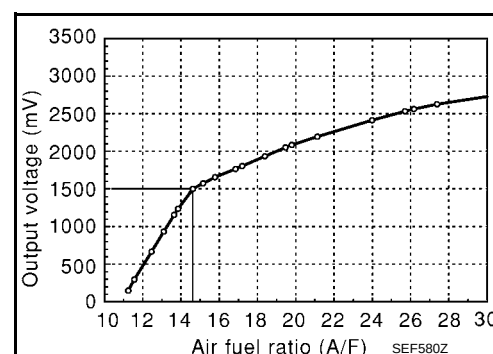
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448837

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448838

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271 (Bank 1) P1281 1281 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 0V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005448839

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 0V, go to [EC-749. "Diagnosis Procedure"](#).
If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-749. "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005448840

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Shift lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.

5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. Make sure that no DTC is detected.
If 1st trip DTC is displayed, go to [EC-749. "Diagnosis Procedure"](#).

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 2]

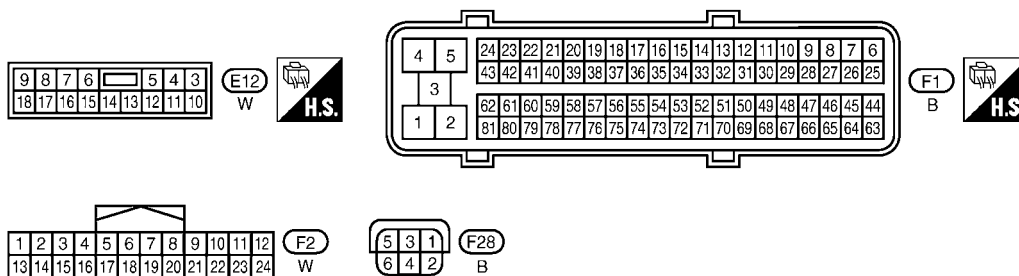
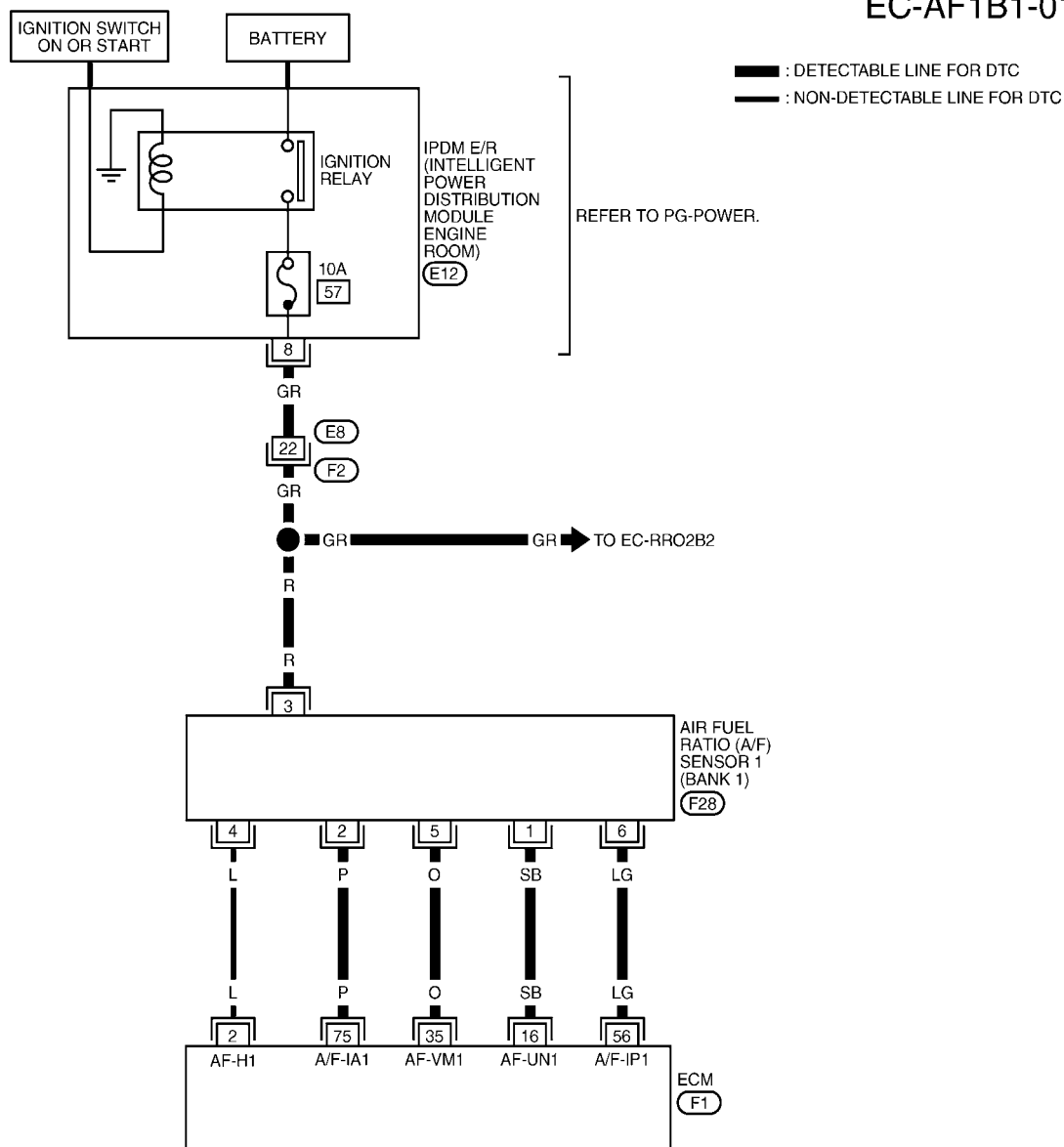
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005448841

BANK 1

EC-AF1B1-01



JMBWA1222GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

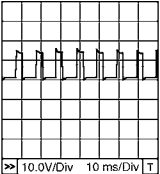
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

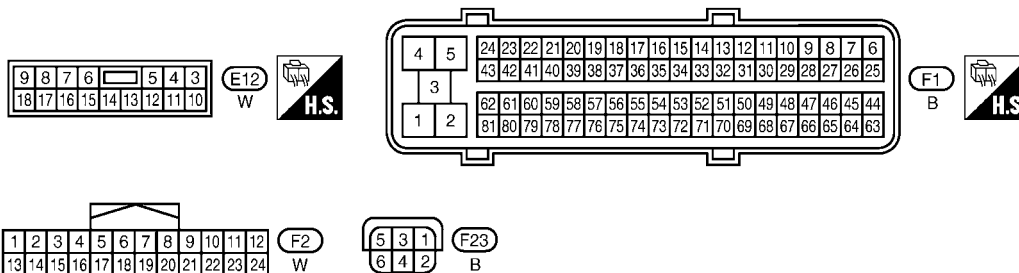
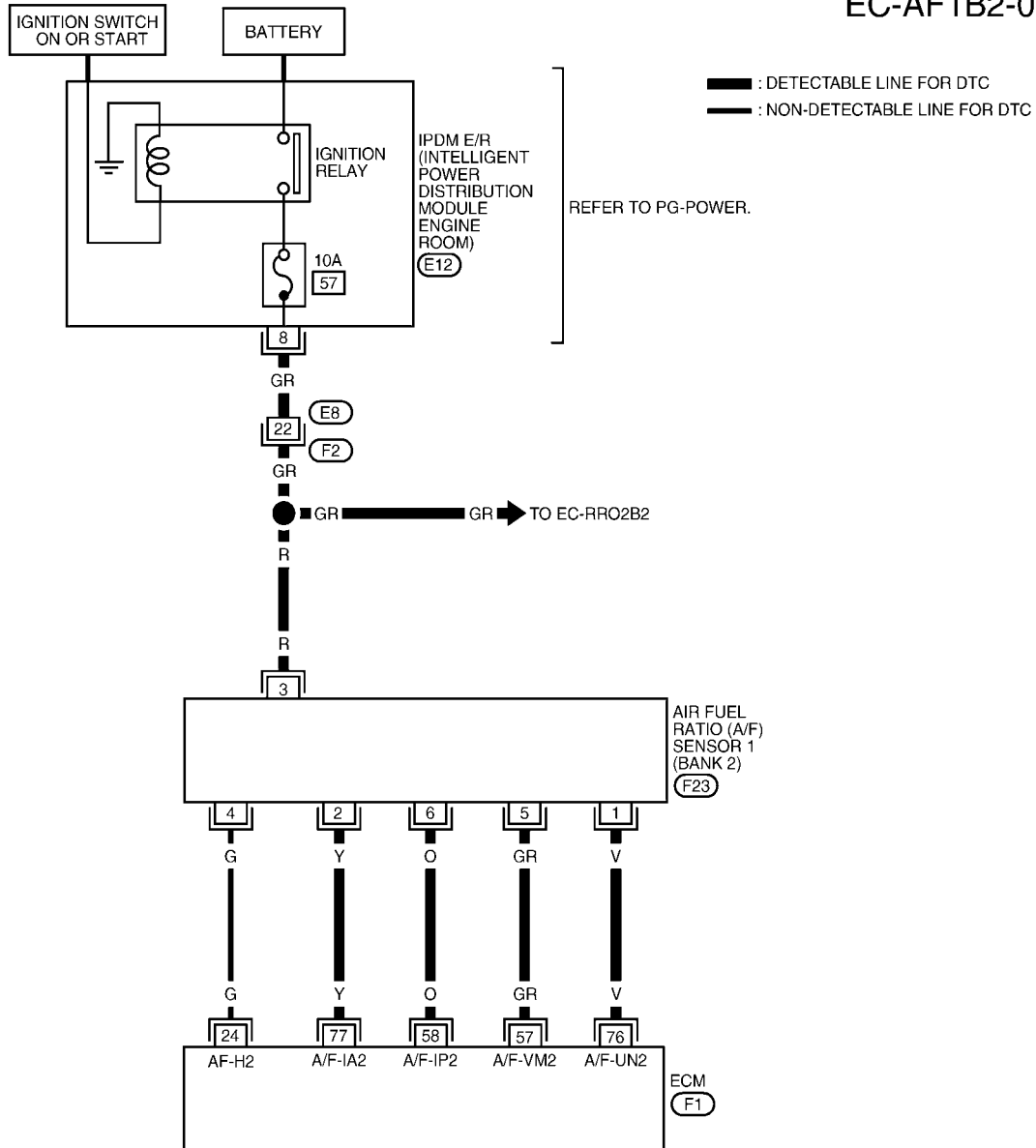
DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

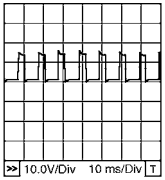
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1223GB

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

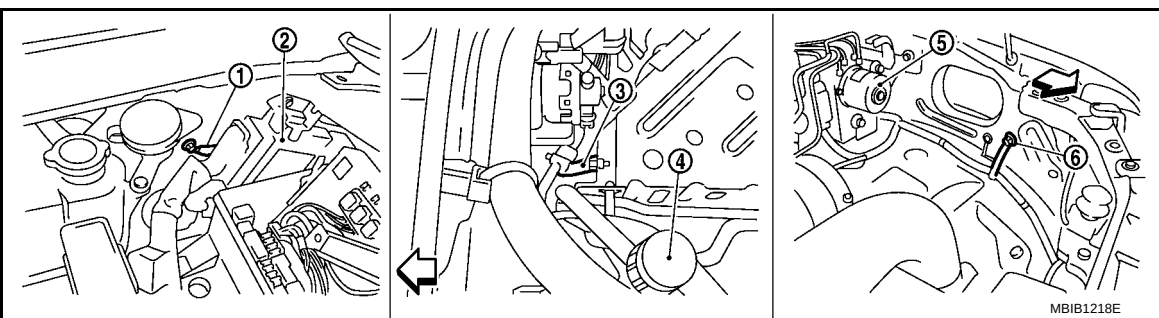
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448842

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

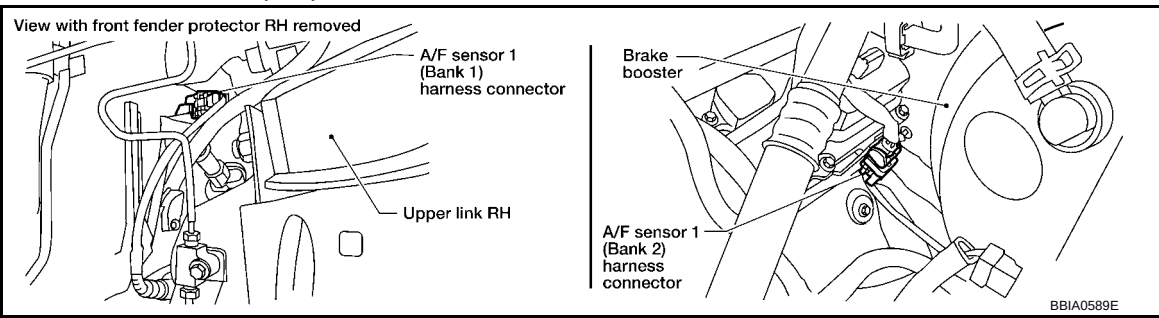
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.

DTC P1271, P1281 A/F SENSOR 1

[VQ TYPE 2]

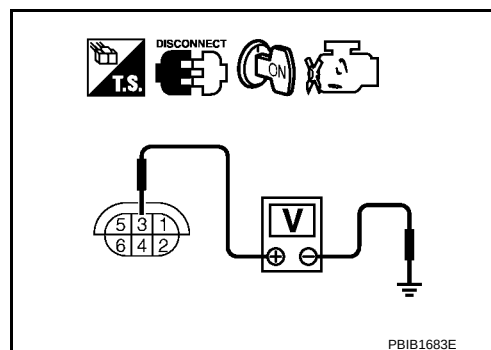
< SERVICE INFORMATION >

3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1271, P1281 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform [EC-620](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448843

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1272, P1282 A/F SENSOR 1

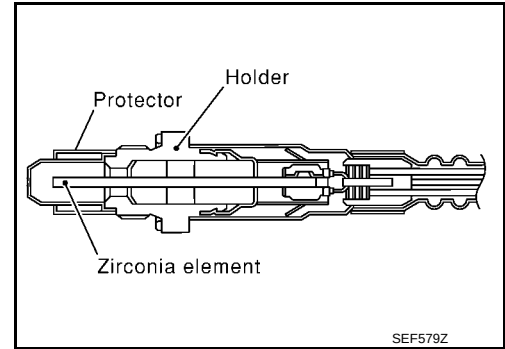
Component Description

INFOID:000000005448844

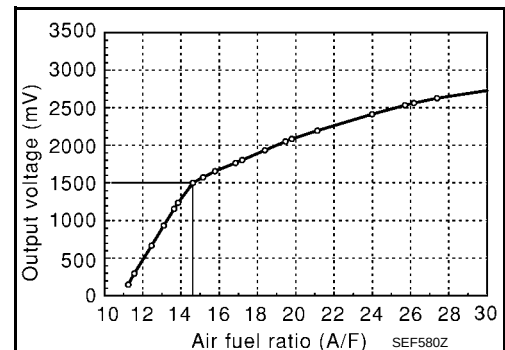
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448845

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448846

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272 (Bank 1) P1282 1282 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 5V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:000000005448847

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓔ WITH CONSULT

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 5V, go to [EC-757. "Diagnosis Procedure"](#).
If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to [EC-757. "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005448848

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Shift lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.

5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. Make sure that no DTC is detected.
If 1st trip DTC is displayed, go to [EC-757. "Diagnosis Procedure"](#).

DTC P1272, P1282 A/F SENSOR 1

[VQ TYPE 2]

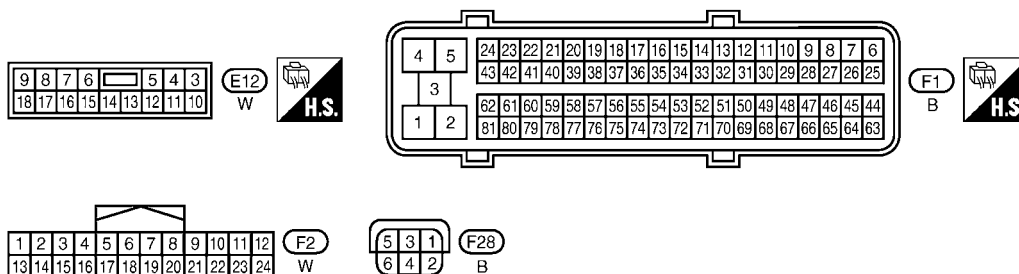
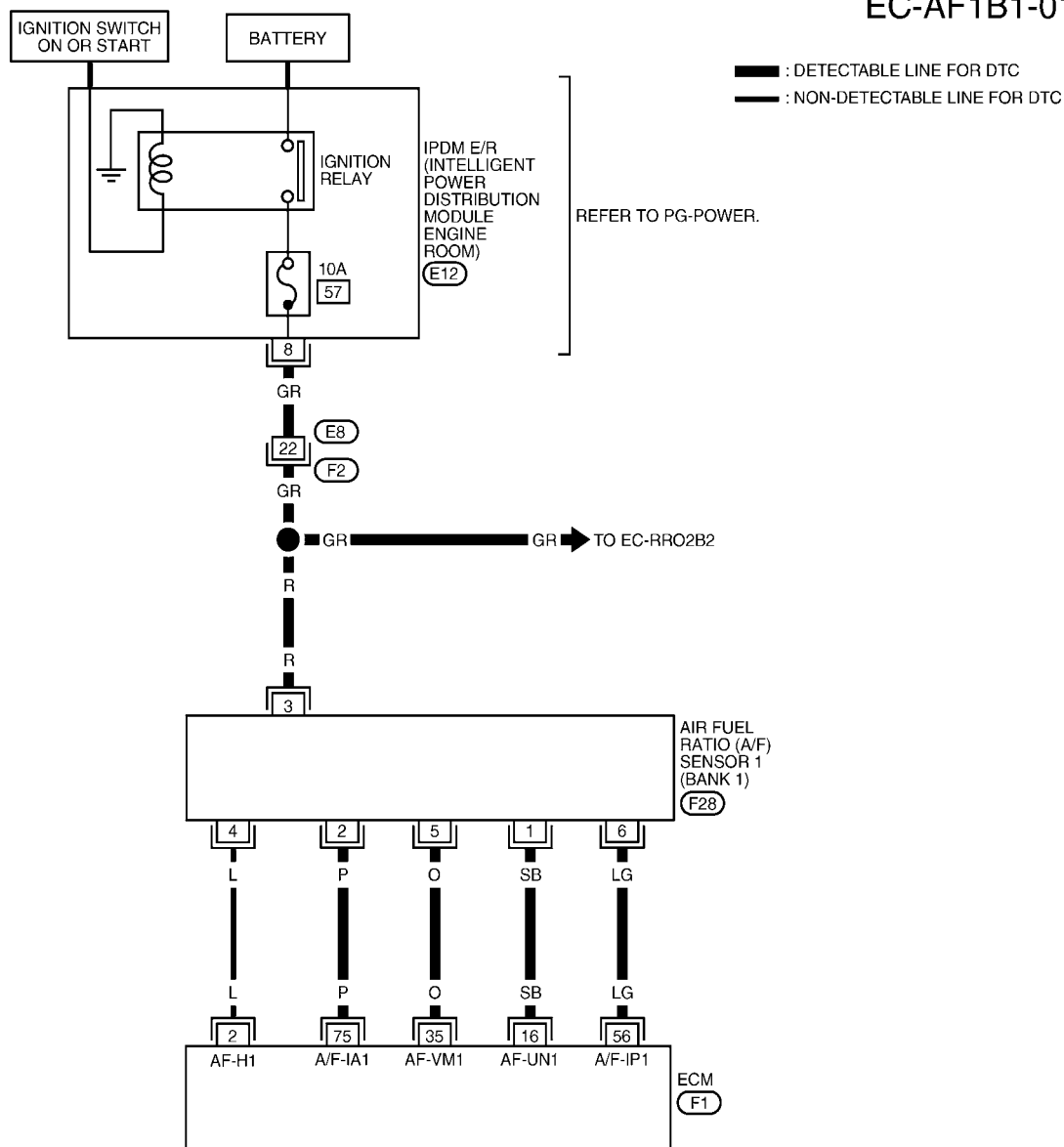
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005448849

BANK 1

EC-AF1B1-01



JMBWA1222GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

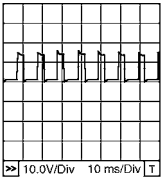
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★ 
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

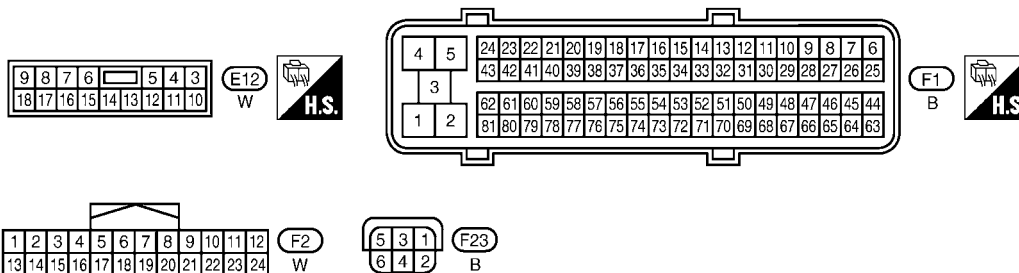
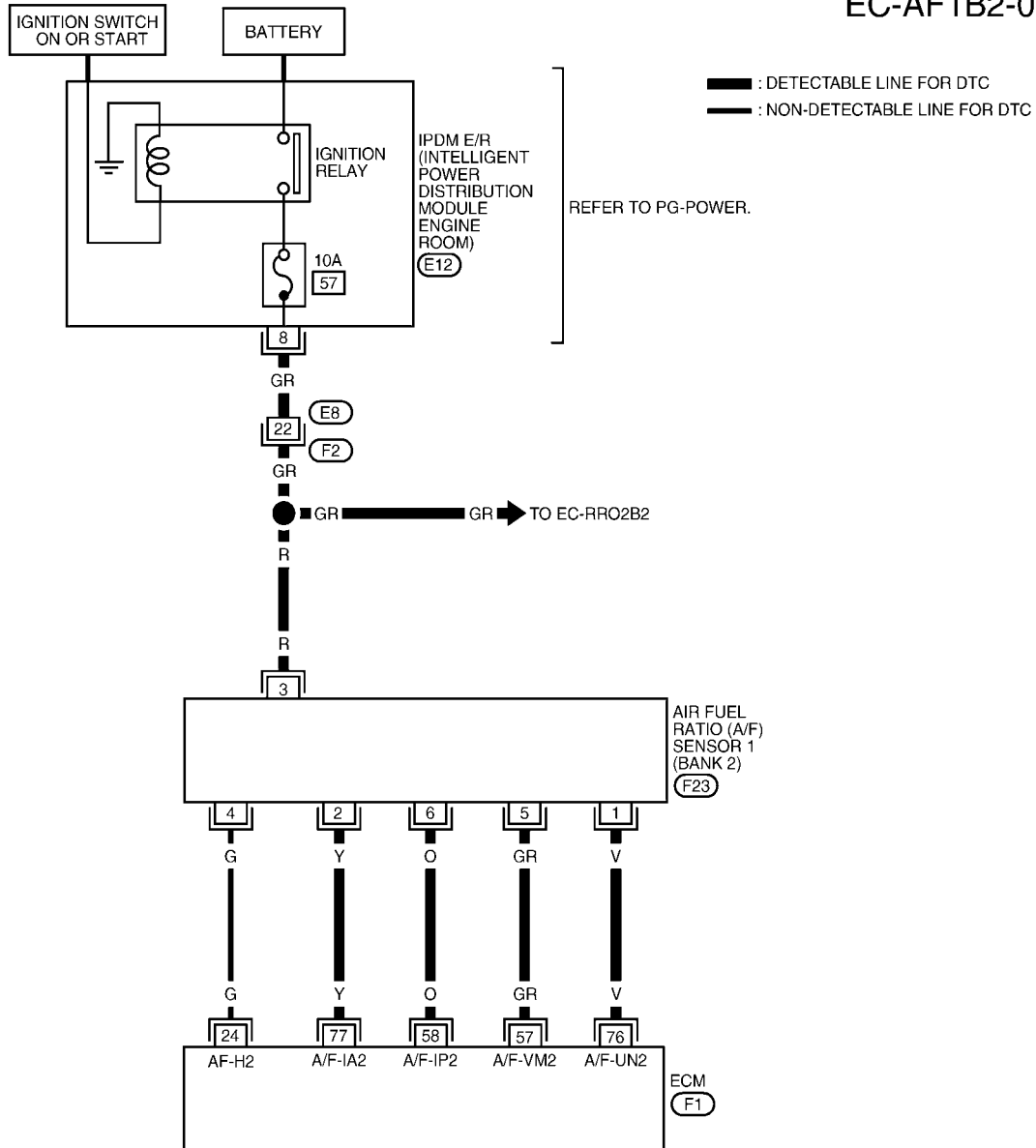
DTC P1272, P1282 A/F SENSOR 1

[VQ TYPE 2]

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

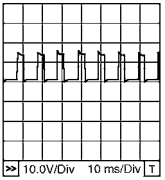
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1223GB

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

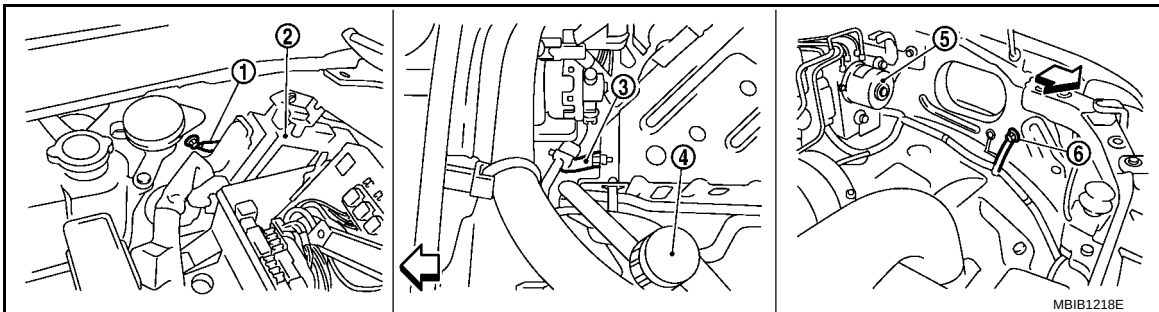
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448850

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws.Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

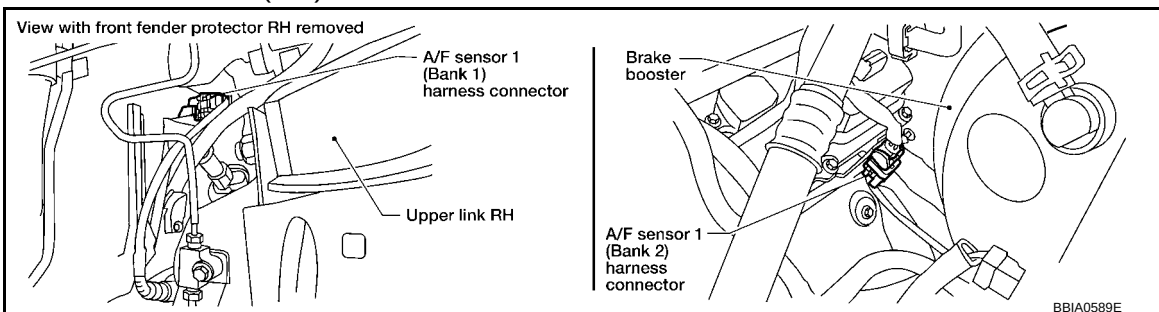
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.



- Turn ignition switch ON.

DTC P1272, P1282 A/F SENSOR 1

[VQ TYPE 2]

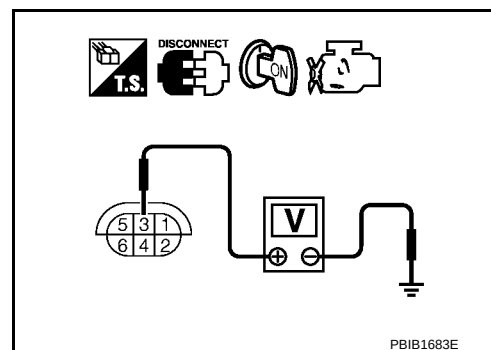
< SERVICE INFORMATION >

3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1272, P1282 A/F SENSOR 1

< SERVICE INFORMATION >		[VQ TYPE 2]
NG >> Repair open circuit or short to ground or short to power in harness or connectors.		A
5.CHECK INTERMITTENT INCIDENT		
Perform EC-620 .		
<u>OK or NG</u>		EC
OK >> GO TO 6.		
NG >> Repair or replace.		
6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1		C
Replace air fuel ratio (A/F) sensor 1.		
CAUTION:		
• Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		D
• Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.		E
>> INSPECTION END		
Removal and Installation		F
		INFOID:000000005448851
AIR FUEL RATIO (A/F) SENSOR 1		
Refer to EM-23 .		G
		H
		I
		J
		K
		L
		M
		N
		O
		P

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1276, P1286 A/F SENSOR 1

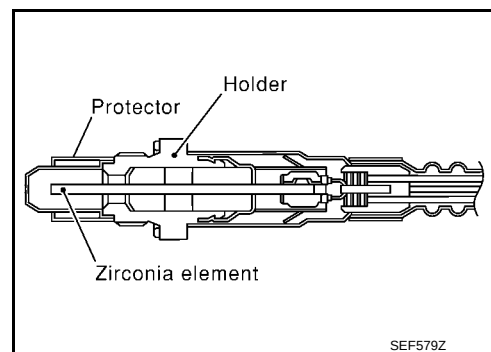
Component Description

INFOID:000000005448852

The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

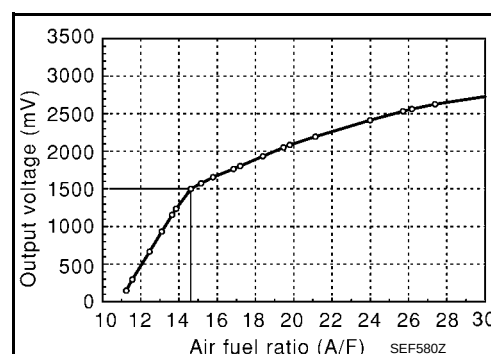
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



SEF579Z

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



SEF580Z

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448853

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

INFOID:000000005448854

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276 (Bank 1) P1286 1286 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 1.5V.	• Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1

Overall Function Check

INFOID:000000005448855

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

WITH CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 1.5V and does not fluctuates, go to [EC-765, "Diagnosis Procedure"](#).
If the indication fluctuates around 1.5V, go to next step. A
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and warm it up to normal operating temperature. EC
6. Select "DATA MONITOR" mode with CONSULT.
7. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
8. Set selector lever to D position with "OD" OFF (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH). C
- NOTE:**
Never apply brake during releasing the accelerator pedal. D
9. Repeat steps 7 to 8 for five times.
10. Stop the vehicle and turn ignition switch OFF.
11. Wait at least 10 seconds and restart engine. E
12. Repeat steps 7 to 8 for five times.
13. Make sure that no DTC is detected.
If the 1st trip DTC is detected, go to [EC-765, "Diagnosis Procedure"](#). F

⊗ WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature. G
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set selector lever to D position with "OD" OFF (A/T) or 5th position (M/T) then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH). H
- NOTE:**
Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times. I
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times. J
8. Stop the vehicle.
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON. K
10. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
11. Make sure that no DTC is detected.
If the 1st trip DTC is detected, go to [EC-765, "Diagnosis Procedure"](#). L

M

N

O

P

DTC P1276, P1286 A/F SENSOR 1

[VQ TYPE 2]

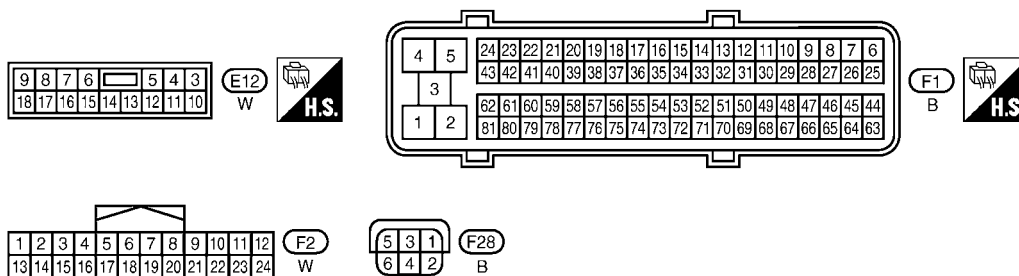
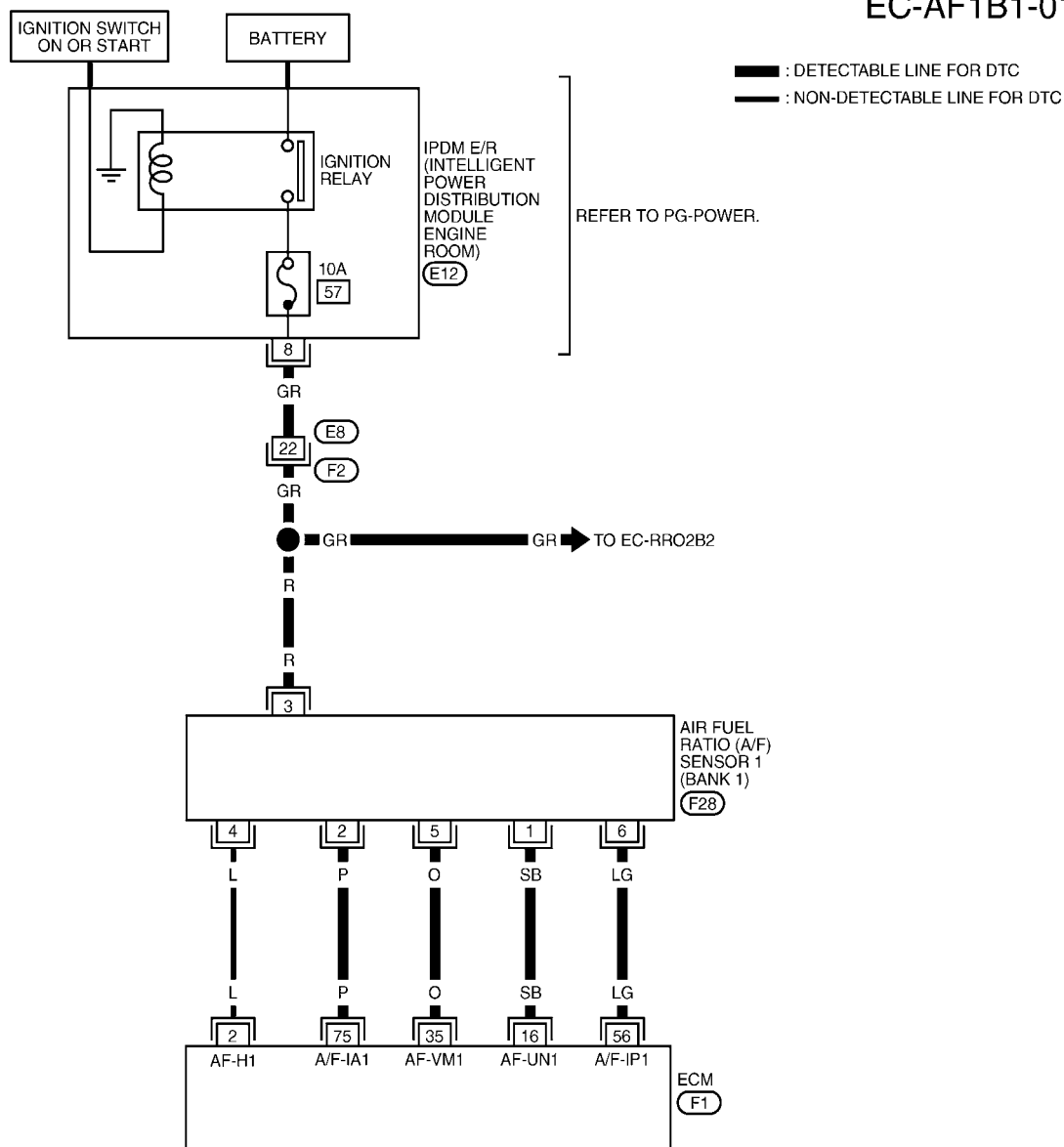
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000005448856

BANK 1

EC-AF1B1-01



JMBWA1222GB

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT.

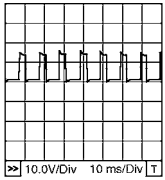
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

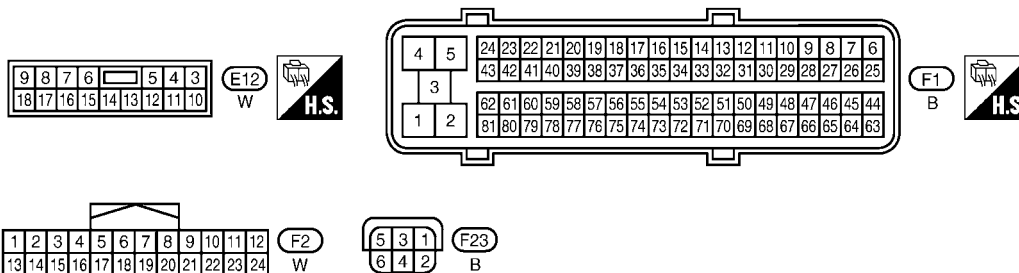
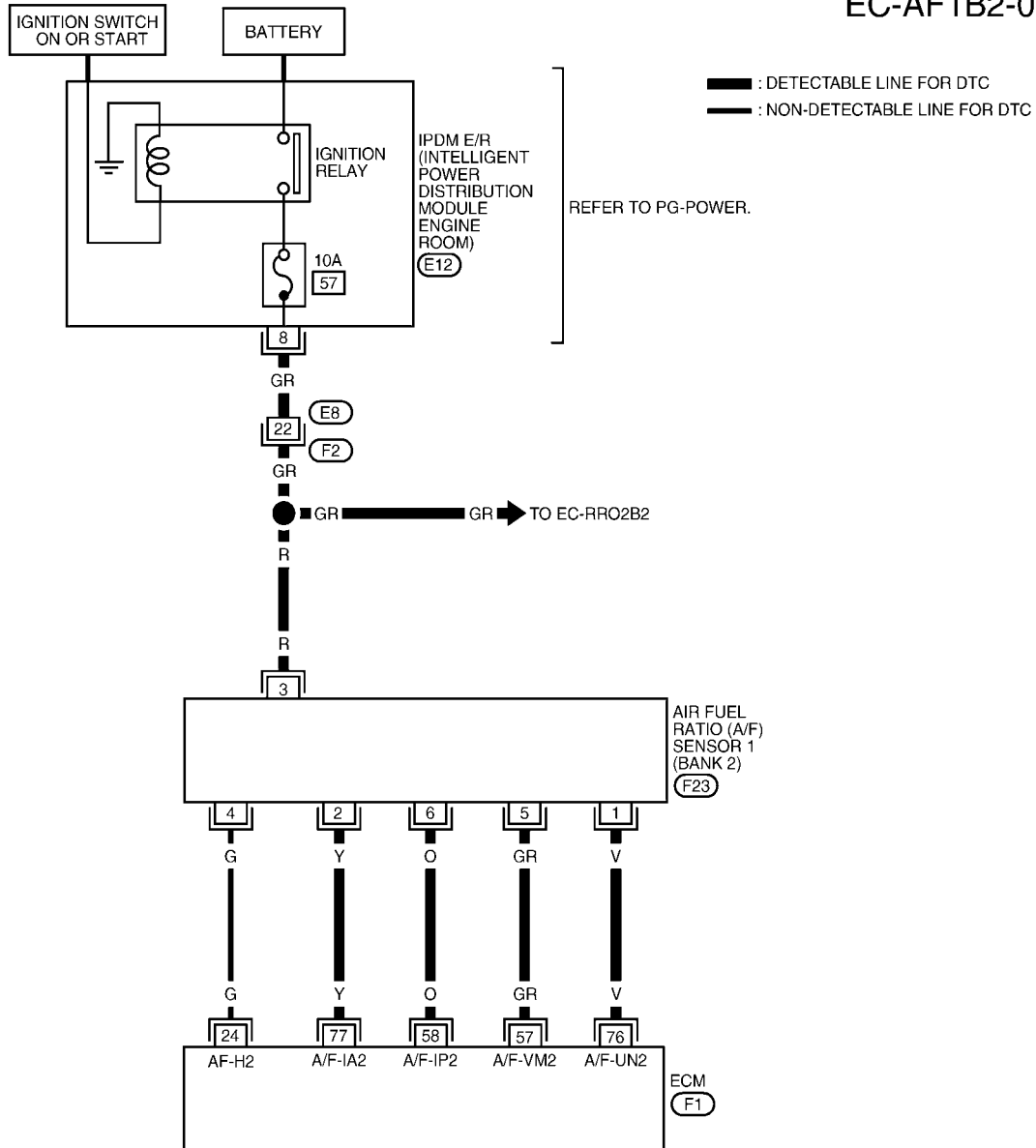
DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

BANK 2

EC-AF1B2-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

CAUTION:

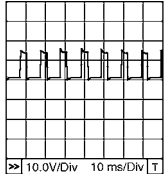
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1223GB

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION >

[VQ TYPE 2]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

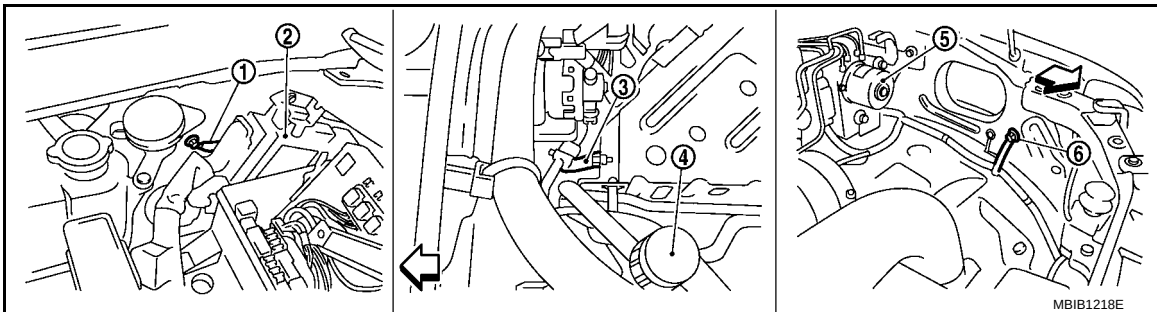
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448857

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

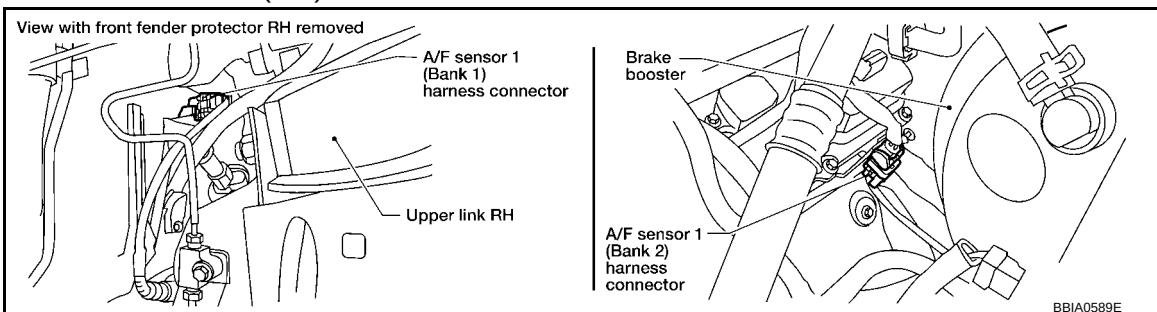
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.



- Turn ignition switch ON.

DTC P1276, P1286 A/F SENSOR 1

[VQ TYPE 2]

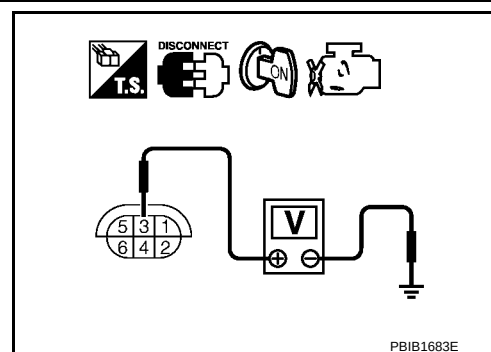
< SERVICE INFORMATION >

3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.

DTC P1276, P1286 A/F SENSOR 1

< SERVICE INFORMATION > [VQ TYPE 2]

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform [EC-620](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

>> INSPECTION END

Removal and Installation

INFOID:000000005448858

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

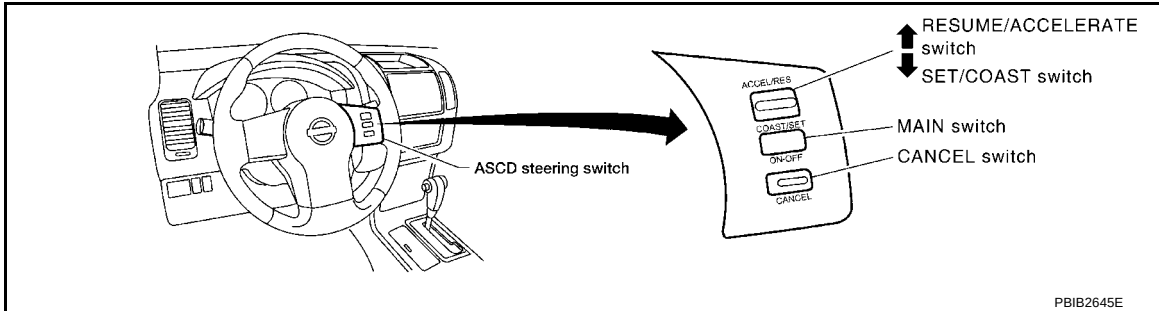
[VQ TYPE 2]

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:000000005448859

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to [EC-543](#) for the ASCD function.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448860

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

INFOID:000000005448861

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-687](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	- An excessively high voltage signal from the ASCD steering switch is sent to ECM. - ECM detects that input signal from the ASCD steering switch is out of the specified range. - ECM detects that the ASCD steering switch is stuck ON.	- Harness or connectors (The switch circuit is open or shorted.) - ASCD steering switch - ECM

DTC Confirmation Procedure

INFOID:000000005448862

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON.

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.
8. If DTC is detected, go to [EC-771, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If DTC is detected, go to [EC-771, "Diagnosis Procedure"](#).

DTC P1564 ASCD STEERING SWITCH

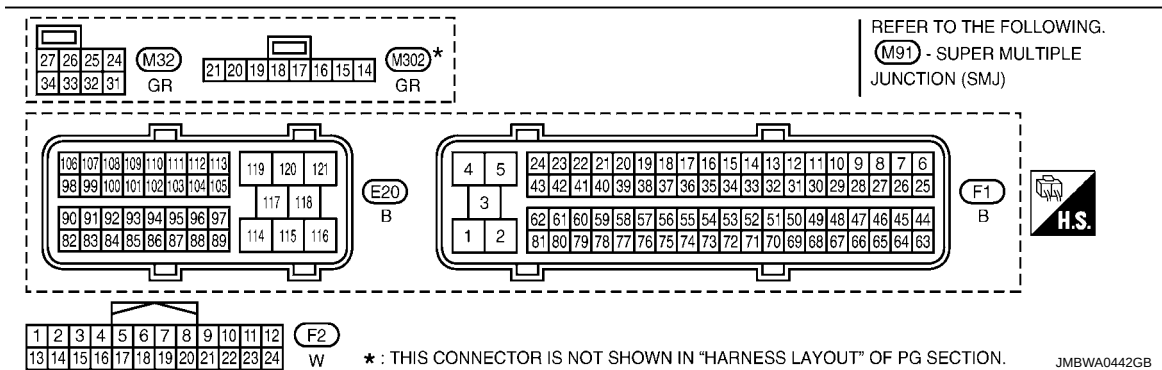
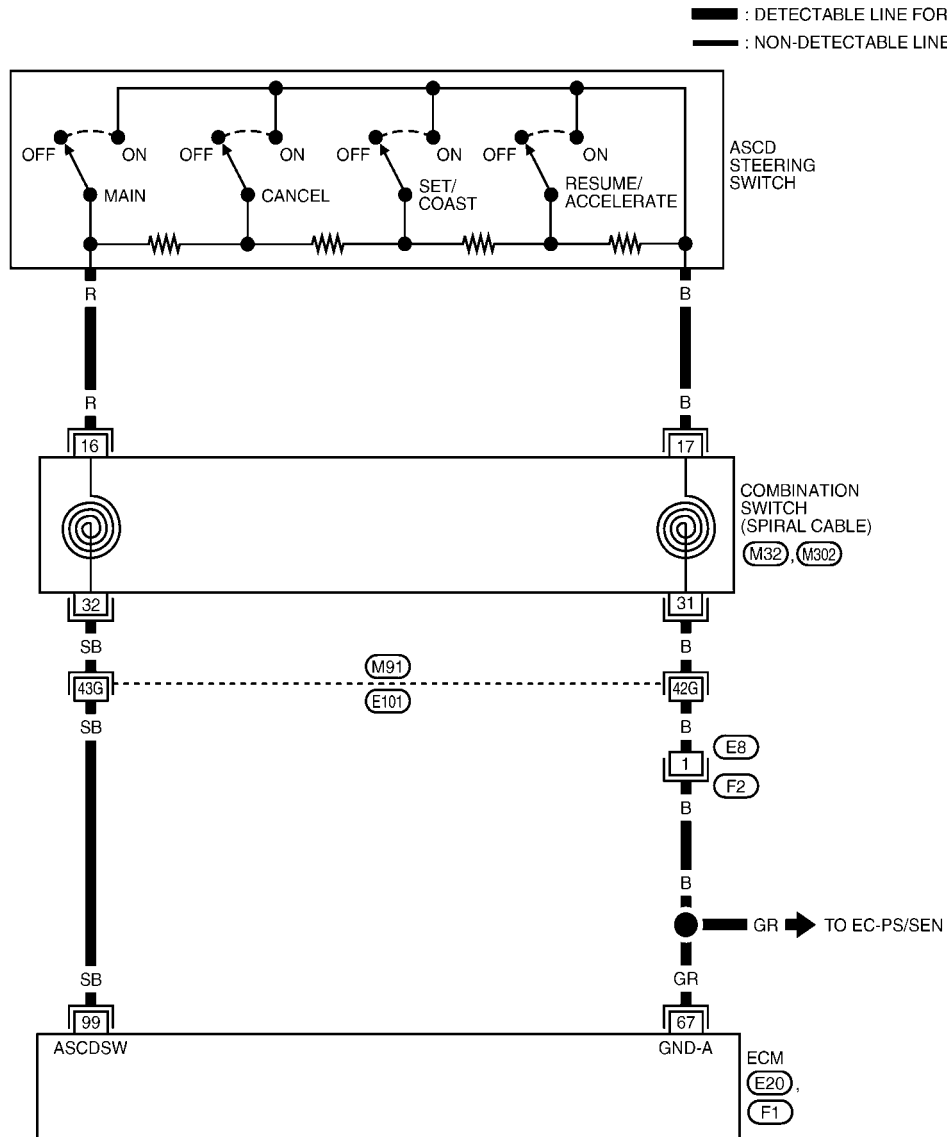
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448863

EC-ASC/SW-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

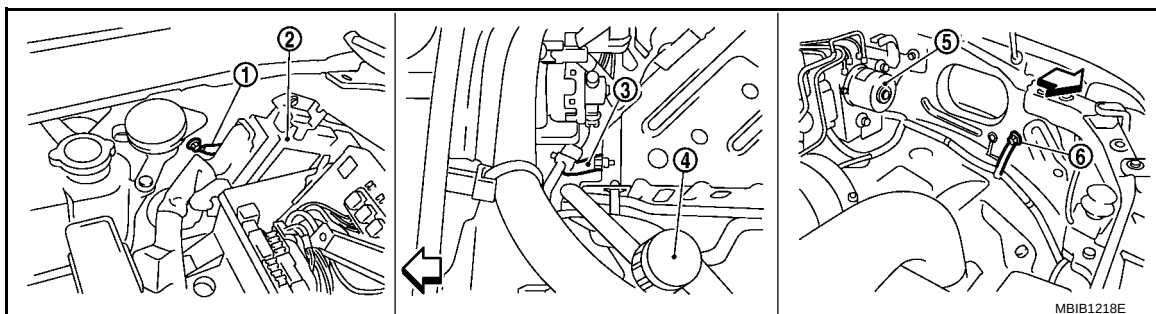
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
99	SB	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V

Diagnosis Procedure

INFOID:00000000544864

1.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627. "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 2]

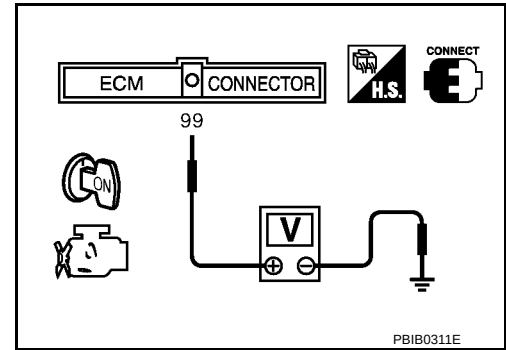
< SERVICE INFORMATION >

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

⊗ Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

- OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 18 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and combination switch terminal 19. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

DTC P1564 ASCD STEERING SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

- OK >> GO TO 7.
- NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD STEERING SWITCH

Refer to [EC-773, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Replace steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620, "Description"](#).

>> **INSPECTION END**

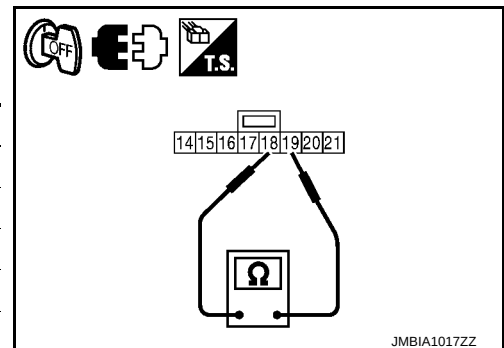
Component Inspection

INFOID:000000005448865

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M302.
2. Check continuity between combination switch (spiral cable) terminals 18 and 19 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

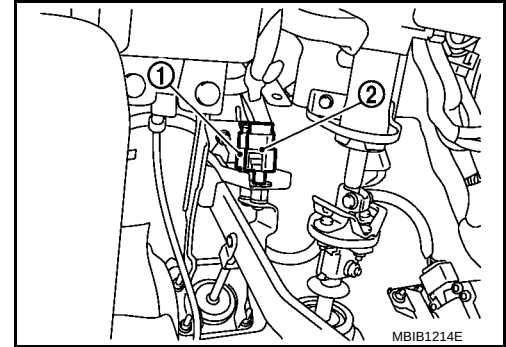
[VQ TYPE 2]

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:000000005448866

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-543](#) for the ASCD function.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448867

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000005448868

This self-diagnosis has the one trip detection logic.

The MIL will not light up for this diagnosis.

NOTE:

- If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-687](#)
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

INFOID:000000005448869

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P1572 ASCD BRAKE SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:

Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator lights up.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-778, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the following step.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-778, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000005448870

Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 (ASCD brake switch signal) and ground under the following conditions.

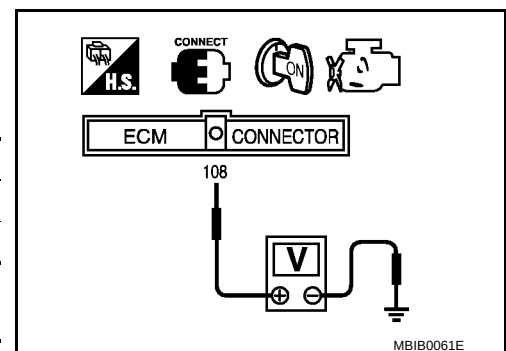
A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

3. If NG, go to [EC-778, "Diagnosis Procedure"](#).
If OK, go to next step.



DTC P1572 ASCD BRAKE SWITCH

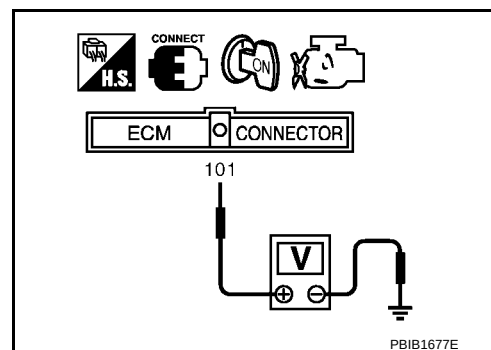
[VQ TYPE 2]

< SERVICE INFORMATION >

4. Check voltage between ECM terminal 101 (stop lamp switch signal) and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

5. If NG, go to [EC-778, "Diagnosis Procedure"](#).



DTC P1572 ASCD BRAKE SWITCH

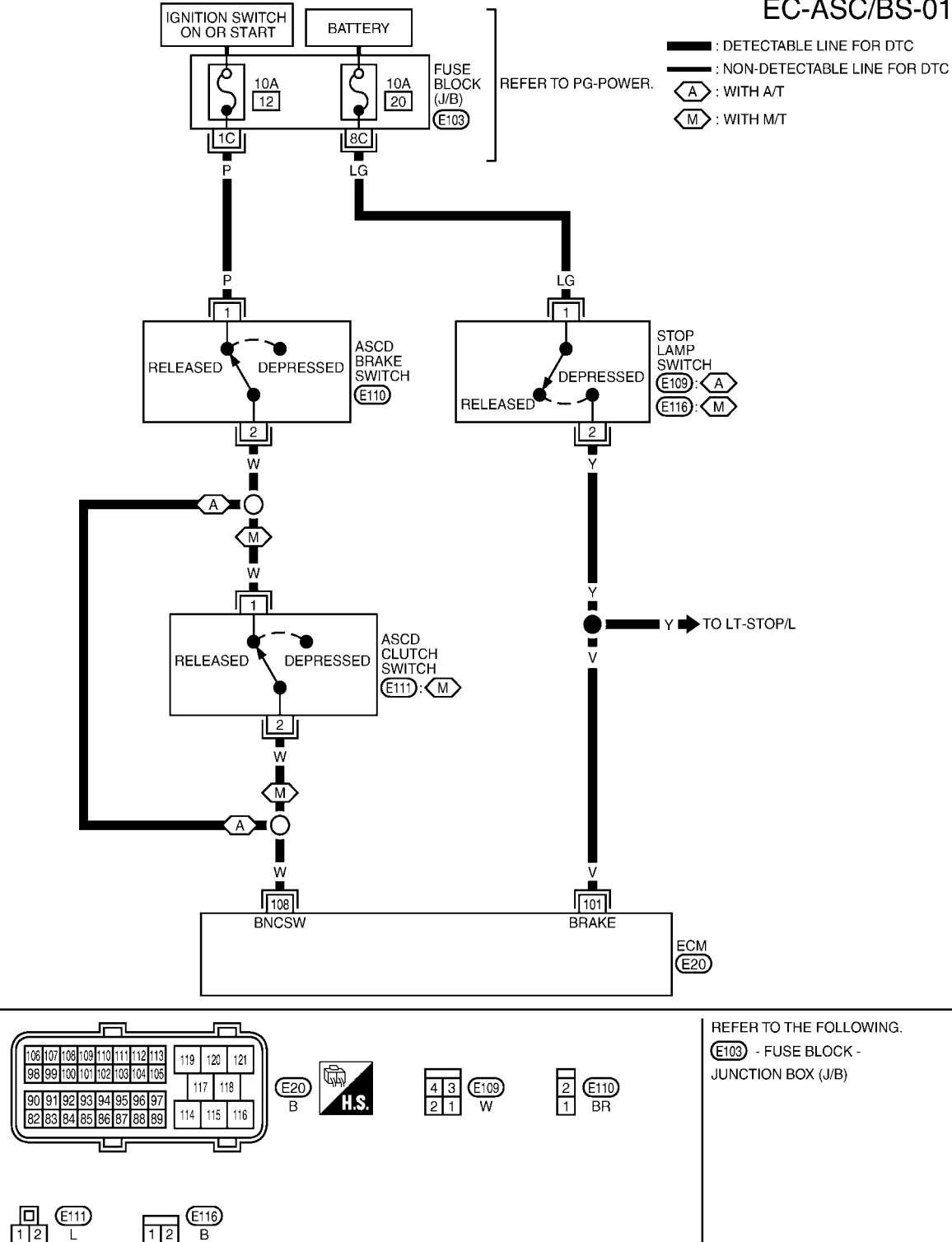
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448871

EC-ASC/BS-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0493GB

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448872

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

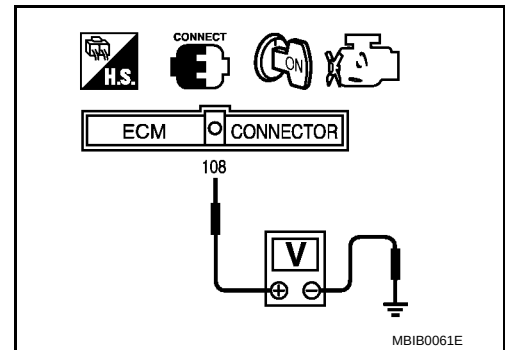
With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.



DTC P1572 ASCD BRAKE SWITCH

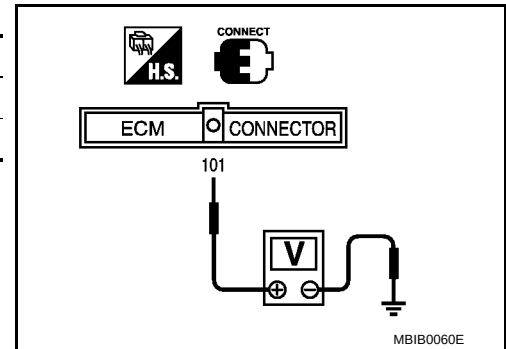
< SERVICE INFORMATION >

[VQ TYPE 2]

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

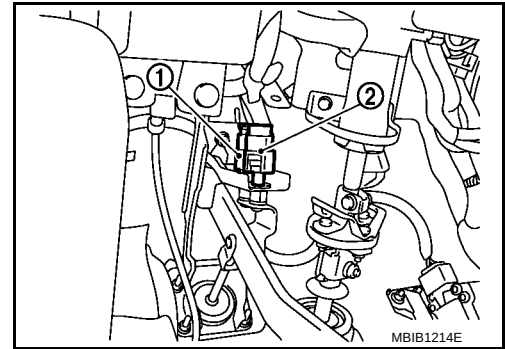
OK or NG

- OK >> GO TO 11.
- NG >> GO TO 7.



3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
 - Stop lamp switch (2)
3. Turn ignition switch ON.

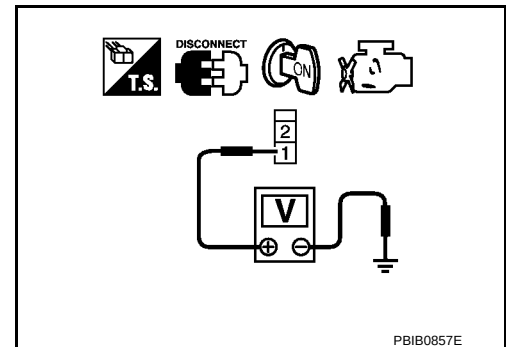


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

6. CHECK ASCD BRAKE SWITCH

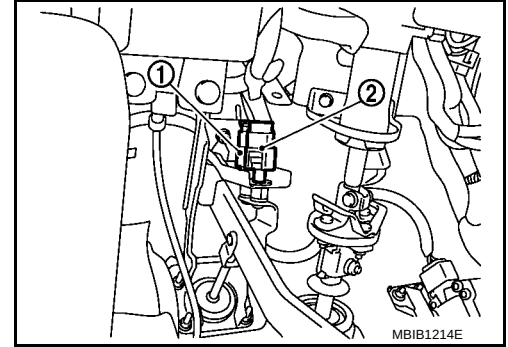
Refer to [EC-784, "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

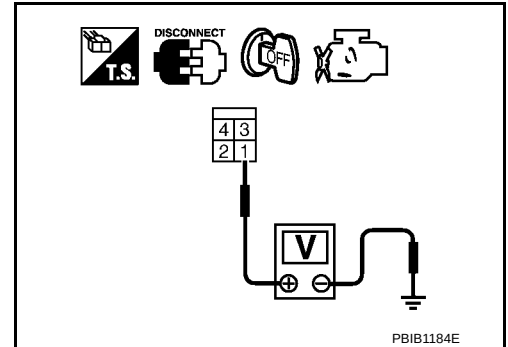


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to [EC-784, "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace stop lamp switch.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

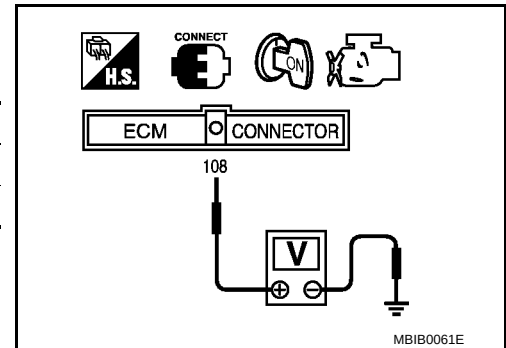
1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

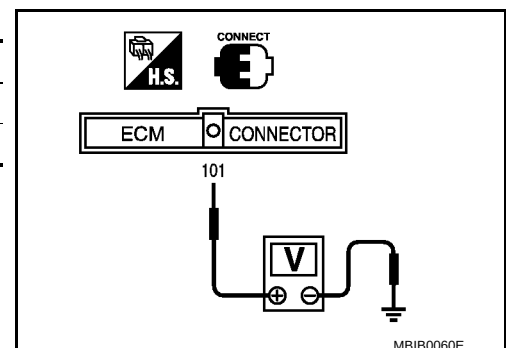
Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

OK or NG

- OK >> GO TO 14.
NG >> GO TO 10.



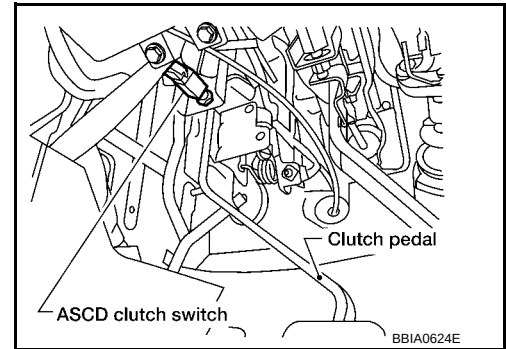
DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

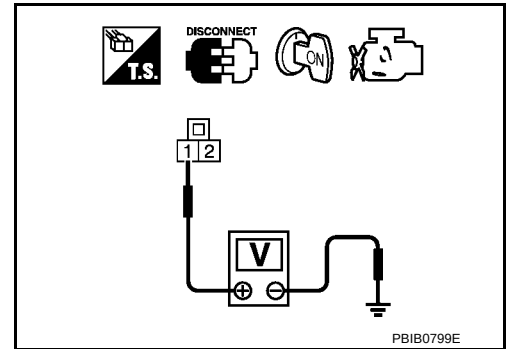


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

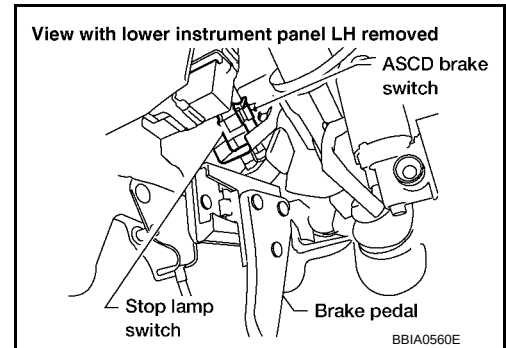
OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

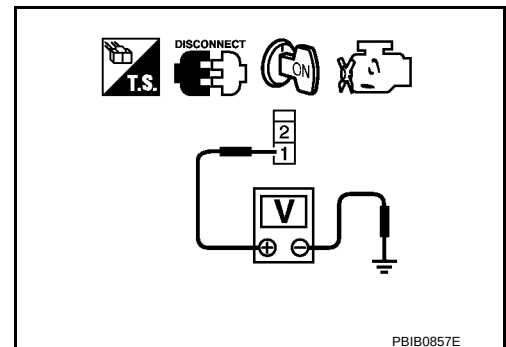


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

>> Repair open circuit or short to ground in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to [EC-784, "Component Inspection"](#)

OK or NG

OK >> GO TO 14.

NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

Refer to [EC-784, "Component Inspection"](#).

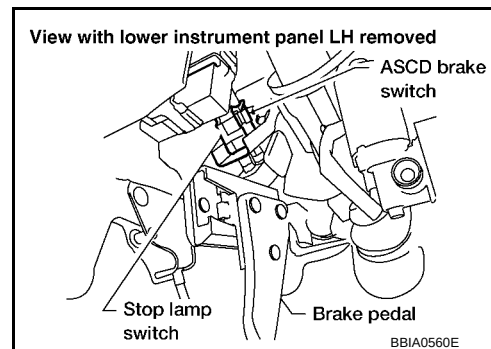
OK or NG

OK >> GO TO 14.

NG >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



DTC P1572 ASCD BRAKE SWITCH

[VQ TYPE 2]

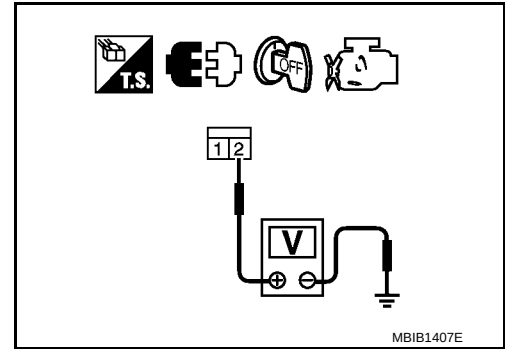
< SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 12.
NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to [EC-784, "Component Inspection"](#).

OK or NG

- OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448873

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

DTC P1572 ASCD BRAKE SWITCH

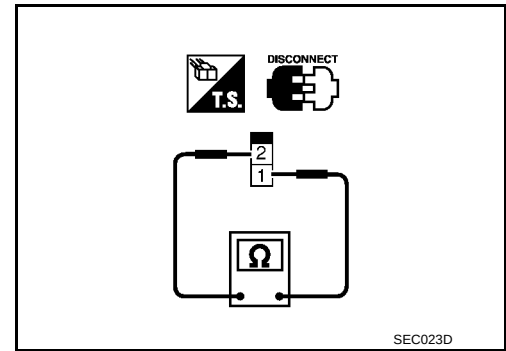
[VQ TYPE 2]

< SERVICE INFORMATION >

- Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to [BR-5](#), and perform step 3 again.

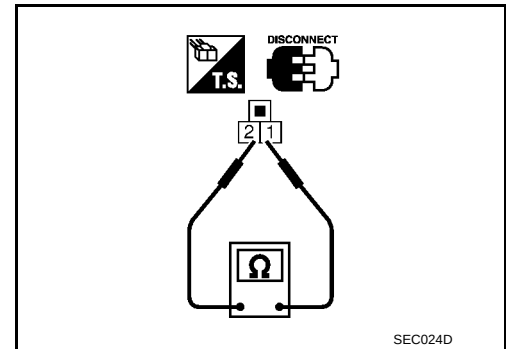


ASCD CLUTCH SWITCH

- Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

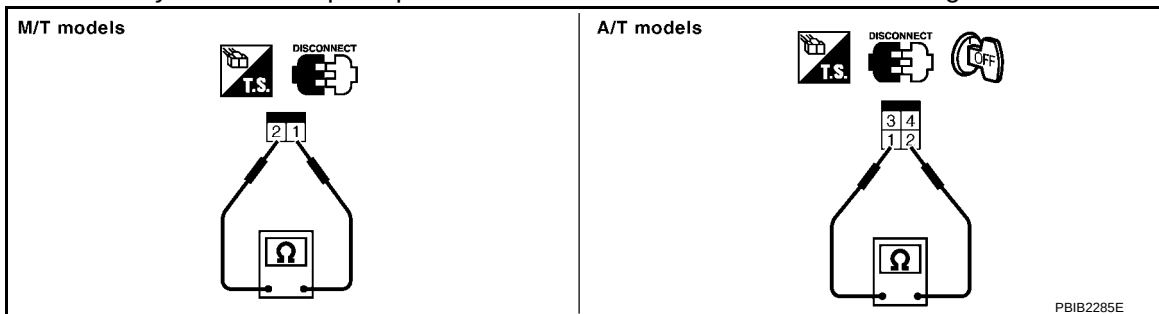
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to [CL-6](#), and perform step 3 again.



STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.

DTC P1706 PNP SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1706 PNP SWITCH

Component Description

INFOID:000000005448874

When the selector lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) signal is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448875

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

INFOID:000000005448876

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] • Park/neutral position (PNP) switch (M/T models) • Combination meter • TCM (A/T models)

Overall Function Check

INFOID:000000005448877

Use this procedure to check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

④ WITH CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF

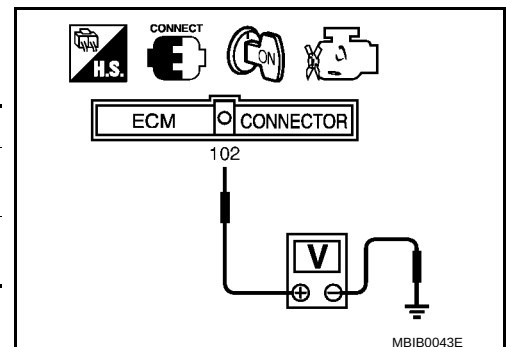
If NG, go to [EC-788, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP signal) and ground under the following conditions.

Condition (Selector lever)	Voltage (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0V
Except above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to [EC-788, "Diagnosis Procedure"](#).



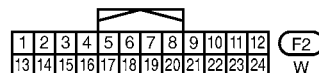
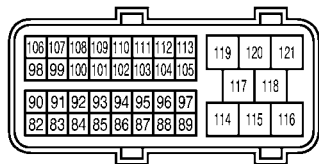
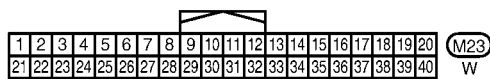
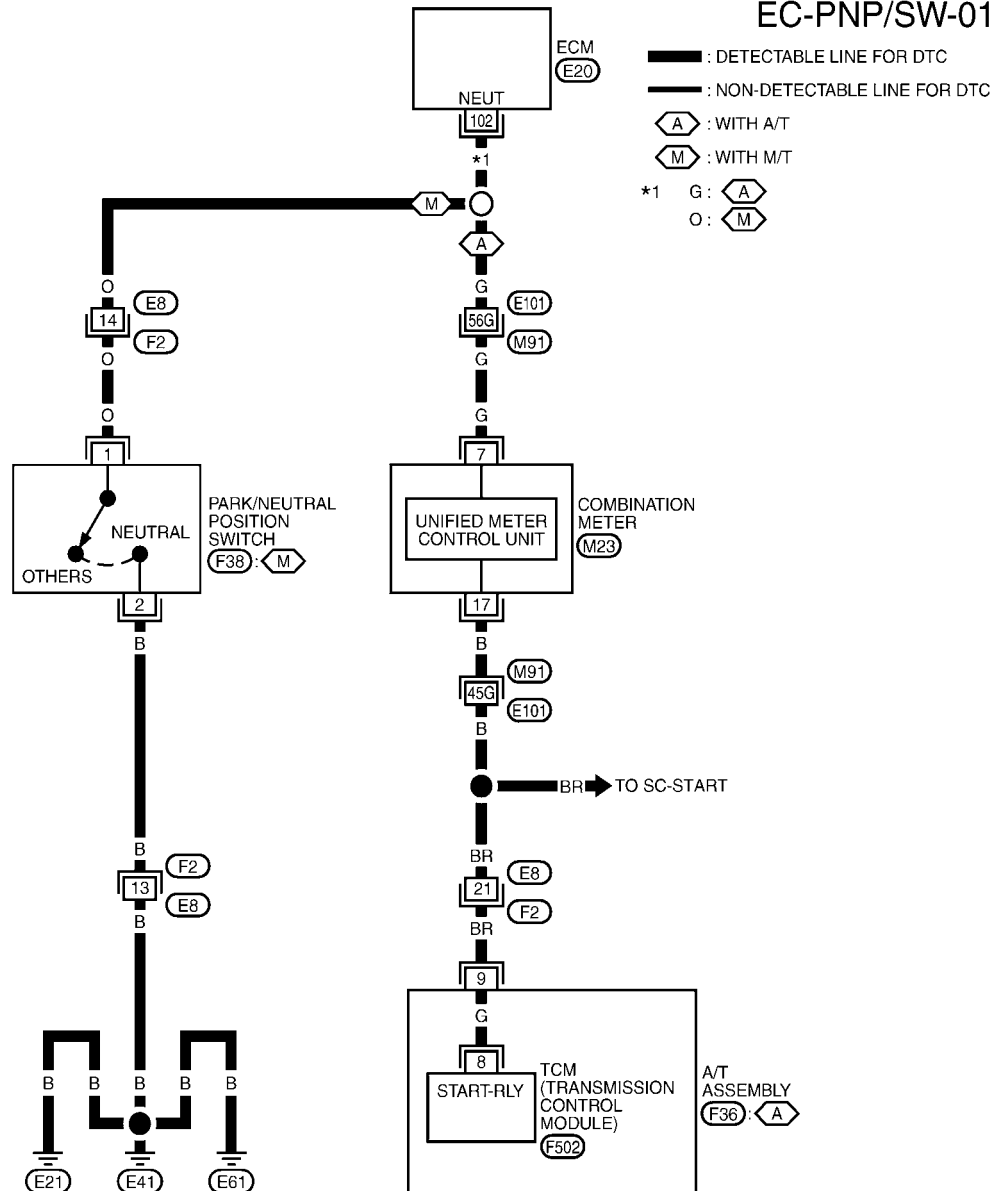
DTC P1706 PNP SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

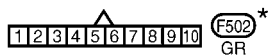
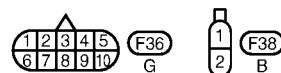
Wiring Diagram

INFOID:000000005448878



REFER TO THE FOLLOWING.

(M91) - SUPER MULTIPLE JUNCTION (SMJ)



* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG. SECTION.

JMBWA1219GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1706 PNP SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G (A/T) O (M/T)	PNP signal	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] • Except above position	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448879

A/T MODELS

1.CHECK DTC WITH TCM

Refer to [AT-48](#).

OK or NG

OK >> GO TO 2.

NG >> Repair or replace.

2.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

Yes or No

Yes >> GO TO 3.

No >> Refer to [SC-35](#).

3.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 17.
Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Harness for open or short between A/T assembly and combination meter.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 7.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

DTC P1706 PNP SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E101, M91
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8.
Refer to [AT-112](#).

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

OK >> GO TO 9.

NG >> Repair or replace.

9.REPLACE COMBINATION METER

Refer to [DI-4](#).

>> **INSPECTION END**

M/T MODELS

1.CHECK PNP SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3

NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F2, E8
- Harness for open or short between PNP switch and ground

>> Repair open circuit or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

DTC P1706 PNP SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between PNP switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK PNP SWITCH

Refer to [MT-13. "Checking"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace PNP switch.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1715 INPUT SPEED SENSOR

Description

INFOID:000000005448880

ECM receives input speed signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448881

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:000000005448882

NOTE:

- If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-629](#).
 - If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-687](#).
 - If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-667](#).
 - If DTC P1715 is displayed with DTC P0340, P0345 first perform the trouble diagnosis for DTC P0340, P0345. Refer to [EC-673](#).
- The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed signal is different from the theoretical value calculated by ECM from output shaft revolution signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:000000005448883

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-48](#).

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to [AT-48](#).

>> INSPECTION END

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P1805 BRAKE SWITCH

Description

INFOID:000000005448884

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448885

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000005448886

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL light up.

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

INFOID:000000005448887

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

⑧ WITH CONSULT

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT.
4. Check DTC.
5. If DTC is detected, go to [EC-794, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to [EC-556, "Malfunction Indicator Lamp \(MIL\)"](#).
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to [EC-794, "Diagnosis Procedure"](#).

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

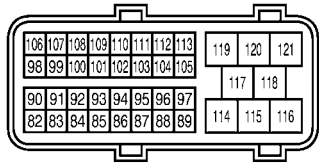
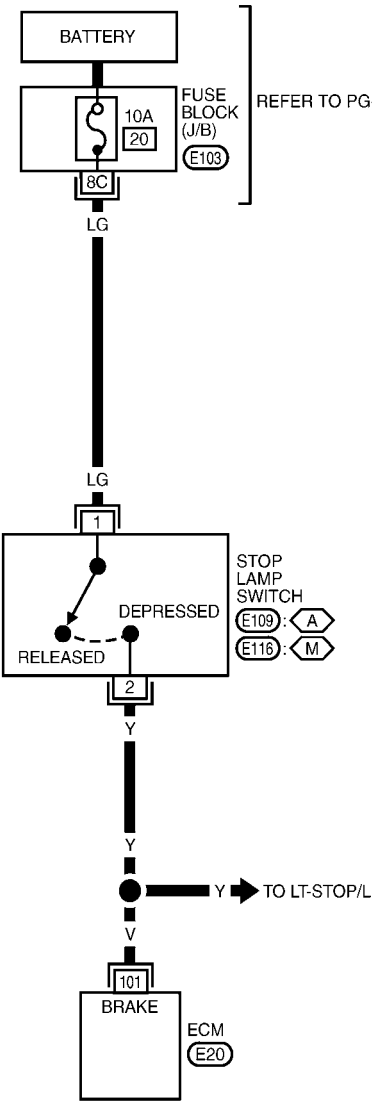
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448888

EC-BRK/SW-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- A : WITH A/T
- M : WITH M/T



E20
B



4 3
2 1

E109
W

1 2

E116
B

REFER TO THE FOLLOWING.
E103 - FUSE BLOCK -
JUNCTION BOX (J/B)

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448889

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

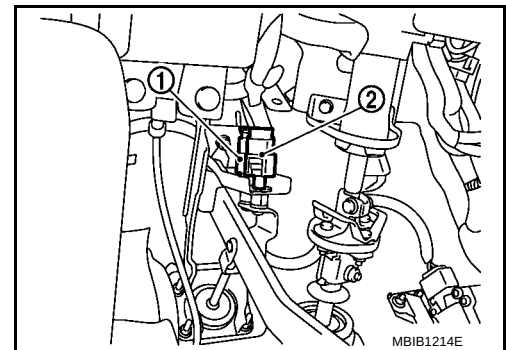
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

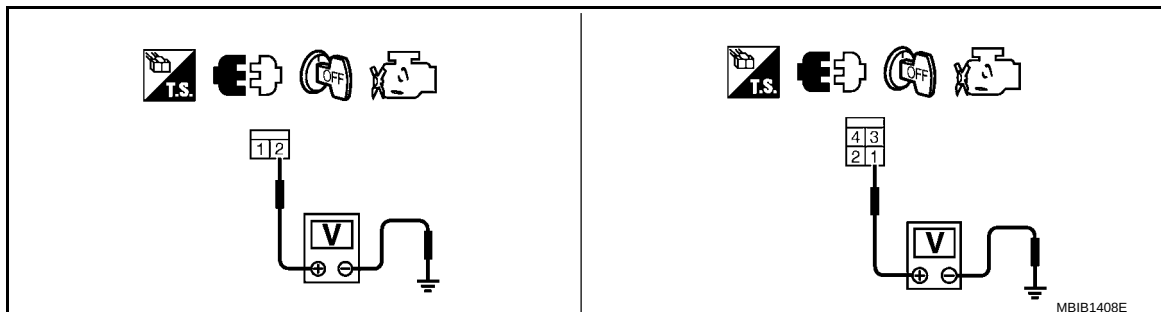
- OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (2) harness connector.
- ASCD brake switch (1)



2. Check voltage between stop lamp switch terminal 1 (A/T) or 2 (M/T) and ground with CONSULT or tester.



M/T models

A/T models

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.

DTC P1805 BRAKE SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

3.DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E103
- Harness for open and short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2 (A/T) or 1 (M/T). Refer to Wiring Diagram.

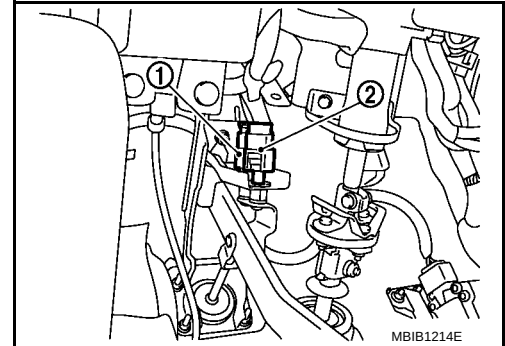
Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



5.CHECK STOP LAMP SWITCH

Refer to [EC-795. "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

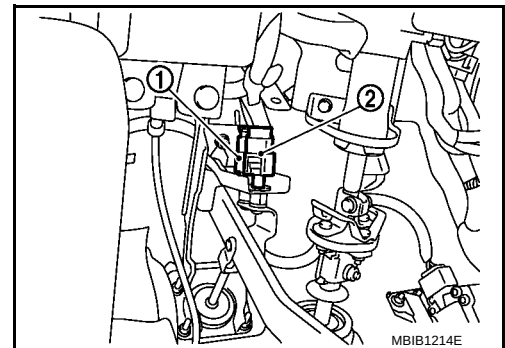
>> **INSPECTION END**

Component Inspection

INFOID:000000005448890

STOP LAMP SWITCH

1. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

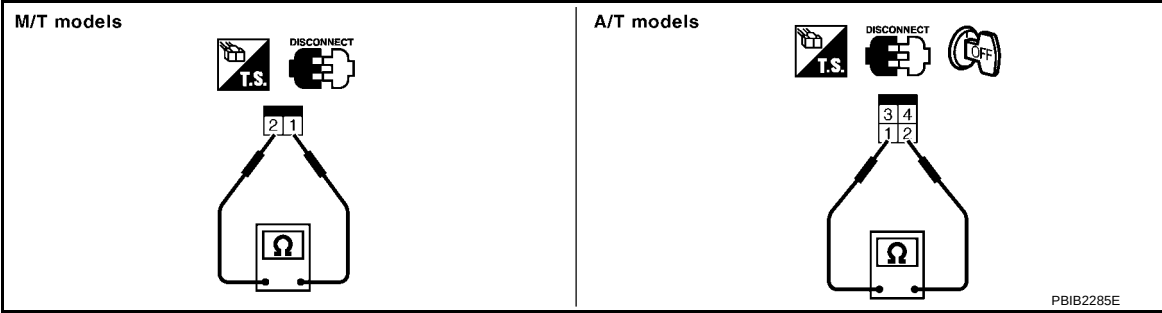


DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

3. If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 2 again.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P2122, P2123 APP SENSOR

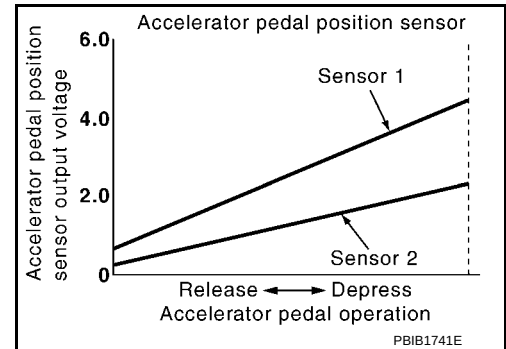
Component Description

INFOID:000000005448891

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448892

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448893

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-737](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (The APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448894

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

DTC P2122, P2123 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-800, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-800, "Diagnosis Procedure"](#).

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

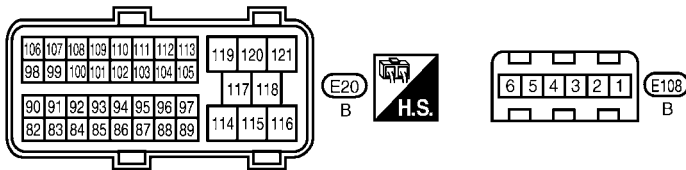
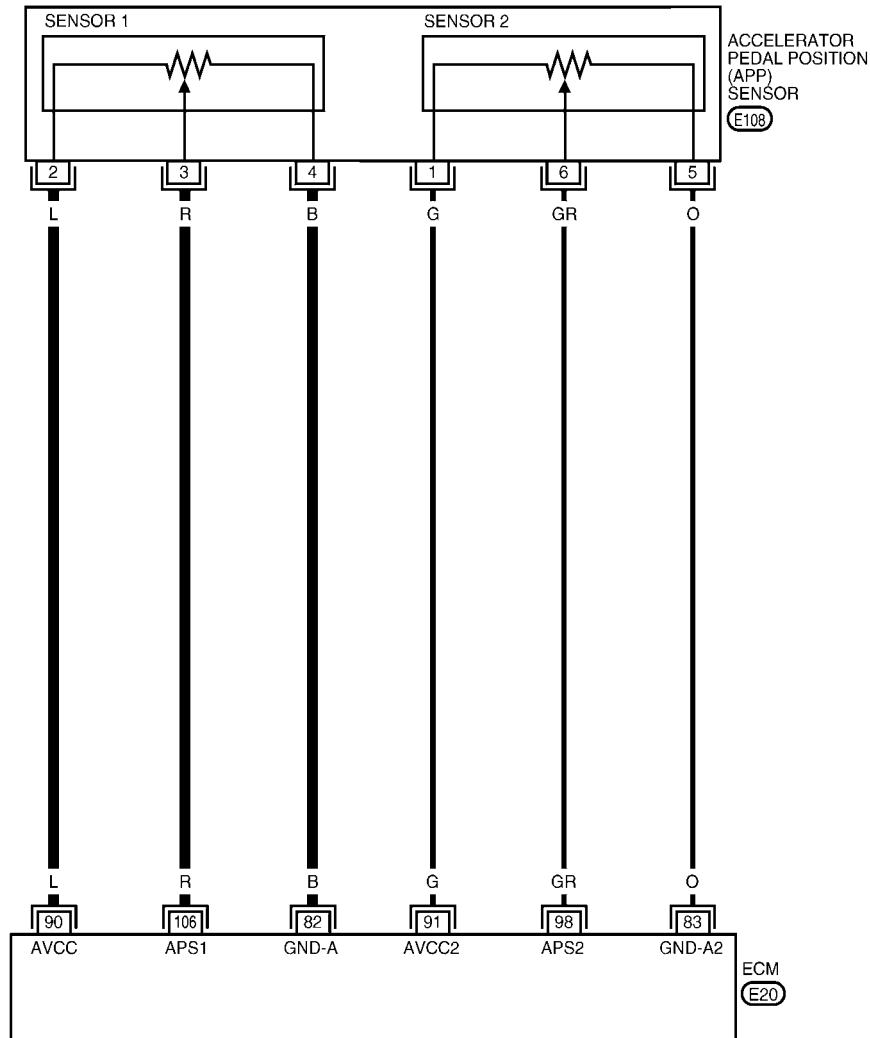
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448895

EC-APPS1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2122, P2123 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

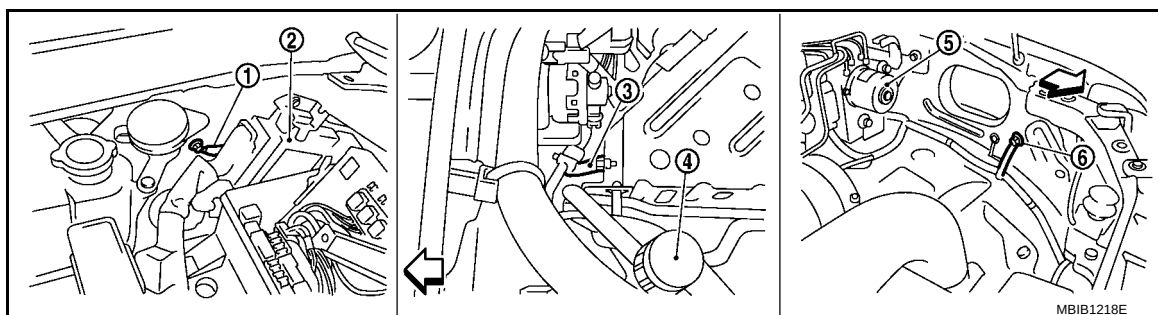
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448896

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

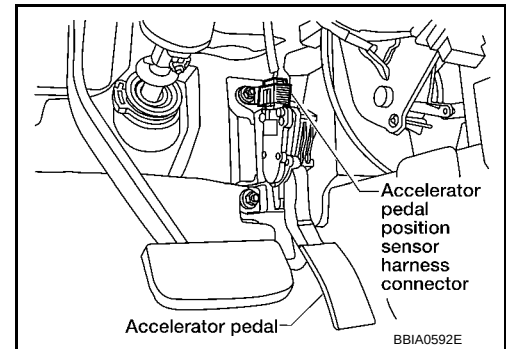
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

DTC P2122, P2123 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

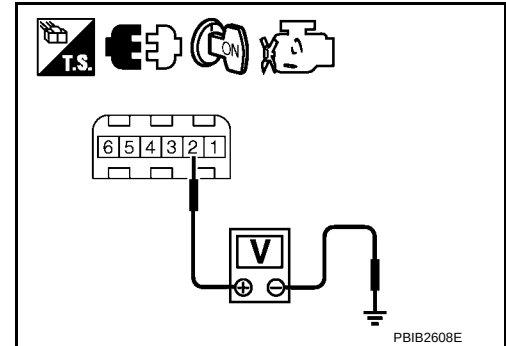


3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-802, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

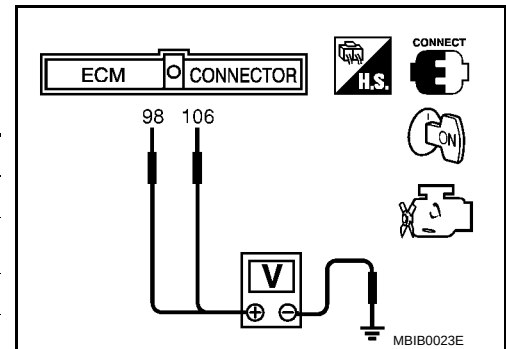
Component Inspection

INFOID:000000005448897

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-566, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005448898

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P2127, P2128 APP SENSOR

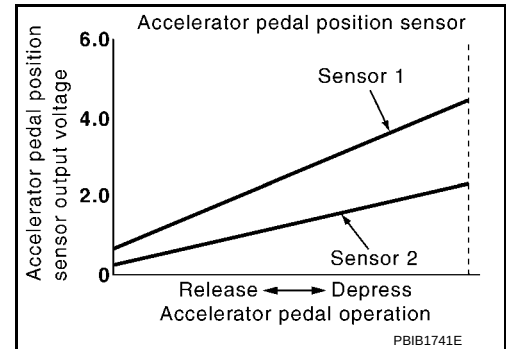
Component Description

INFOID:000000005448899

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448900

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448901

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit shorted.) • Accelerator pedal position sensor (APP sensor 2) • Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448902

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

DTC P2127, P2128 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

⑧ WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-806, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-806, "Diagnosis Procedure"](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

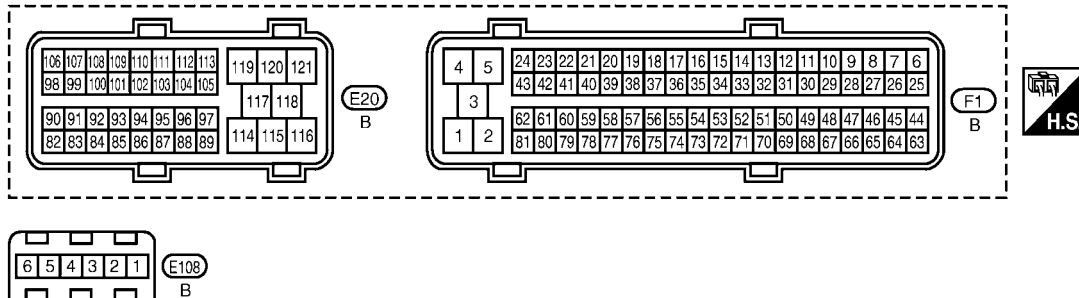
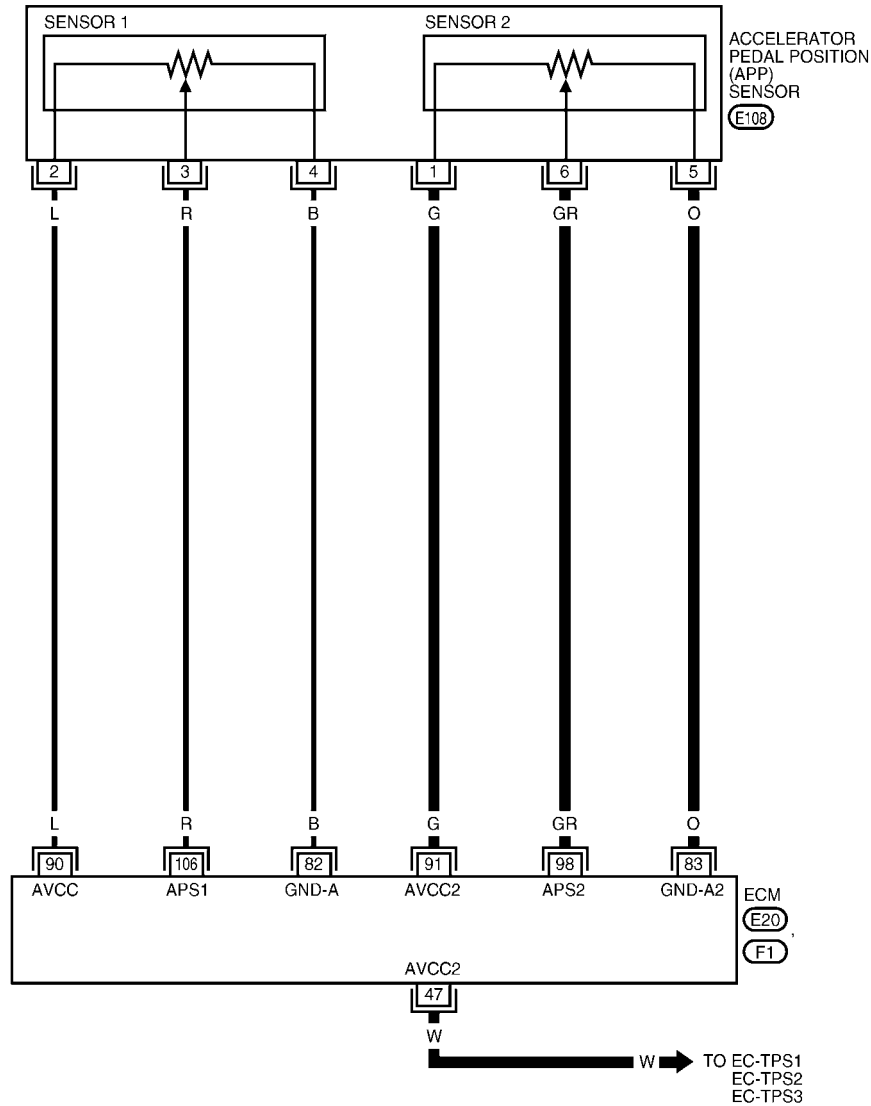
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448903

EC-APPS2-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2127, P2128 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

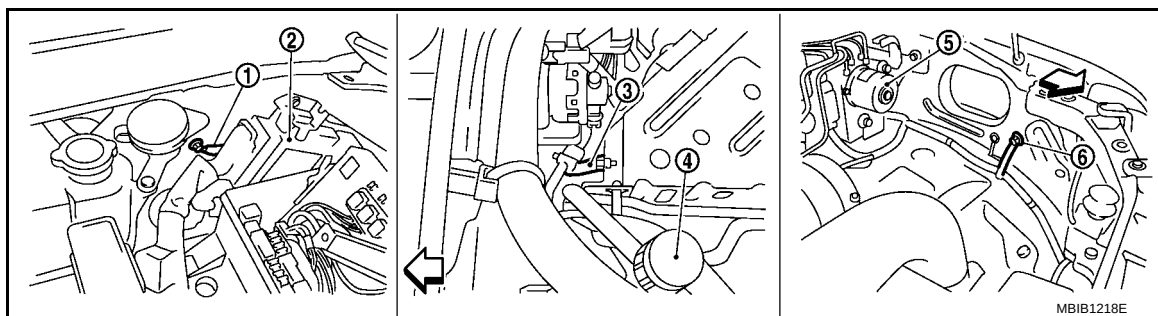
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448904

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body, Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

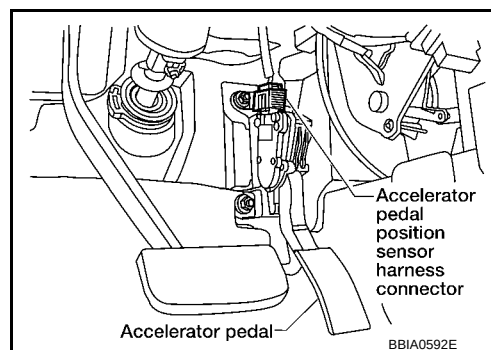
2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

DTC P2127, P2128 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

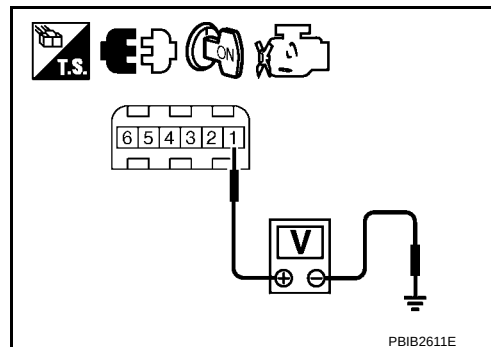


3. Check voltage between APP sensor terminal 1 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-805
47	Electric throttle control actuator terminal 2	EC-812

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-815, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

>> **INSPECTION END**

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to [EC-808, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448905

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

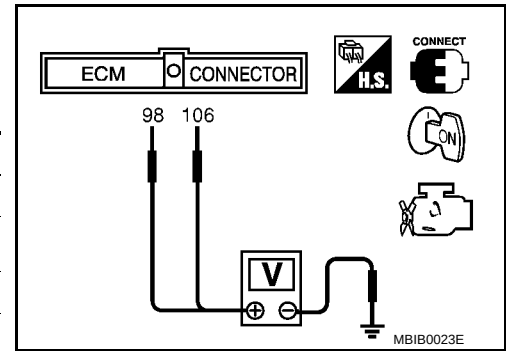
DTC P2127, P2128 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-566, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:0000000005448906

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

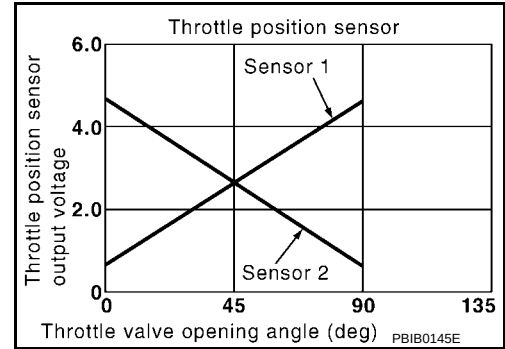
DTC P2135 TP SENSOR

Component Description

INFOID:000000005448907

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448908

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:000000005448909

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted). • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448910

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.

DTC P2135 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Check DTC.
3. If DTC is detected, go to [EC-813, "Diagnosis Procedure"](#).

⊗ WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-813, "Diagnosis Procedure"](#).

A

EC

C

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DTC P2135 TP SENSOR

< SERVICE INFORMATION >

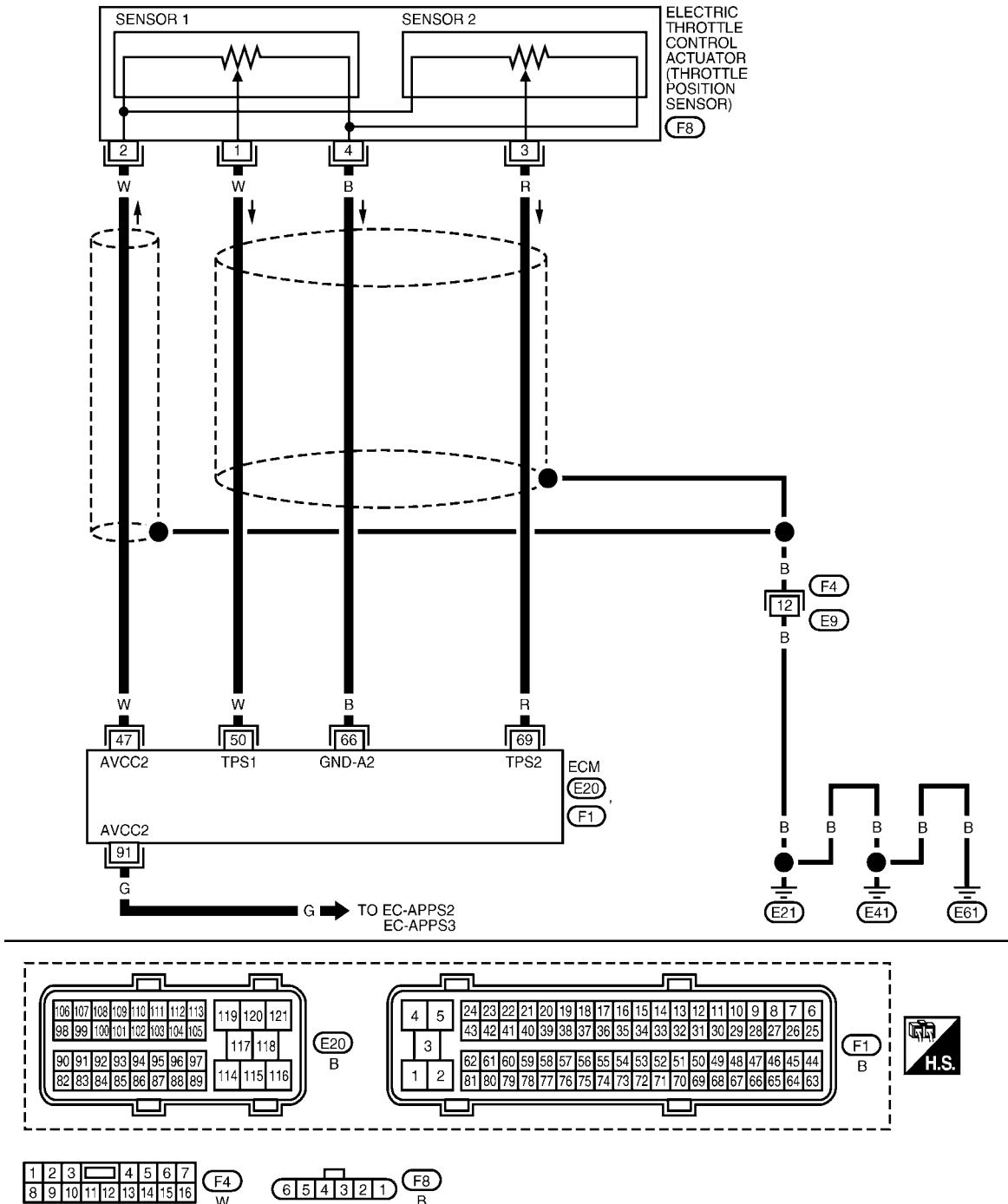
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448911

EC-TPS3-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

MBWA1315E

DTC P2135 TP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

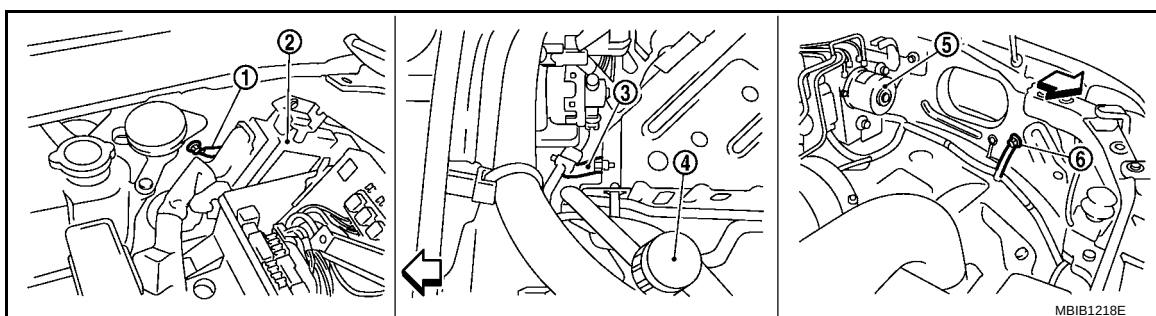
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
50	W	Throttle position sensor 1	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
69	R	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V

Diagnosis Procedure

INFOID:000000005448912

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to [EC-627, "Ground Inspection"](#).



⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
 NG >> Repair or replace ground connections.

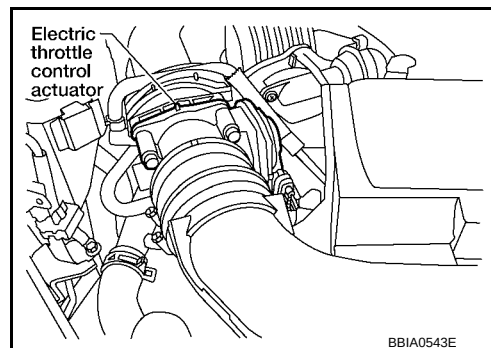
2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

DTC P2135 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

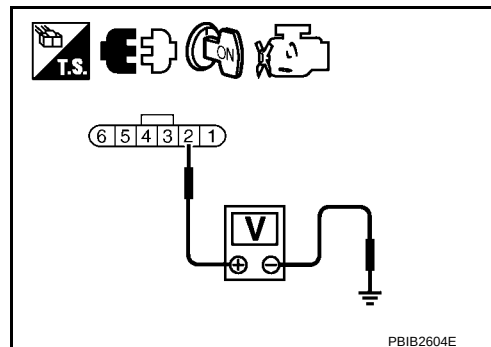


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
NG >> GO TO 3.



3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-812
91	APP sensor terminal 1	EC-805

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to [EC-808, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to [EC-815, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:0000000005448913

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).

DTC P2135 TP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

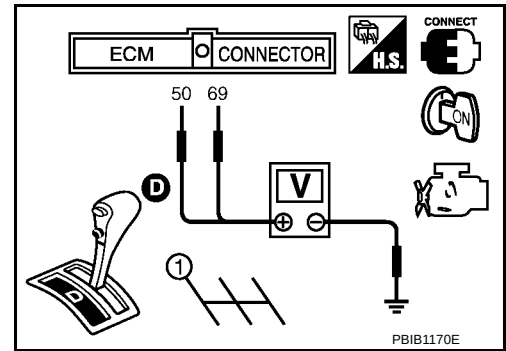
7. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-566, "Idle Air Volume Learning"](#).

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).



INFOID:0000000005448914

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

DTC P2138 APP SENSOR

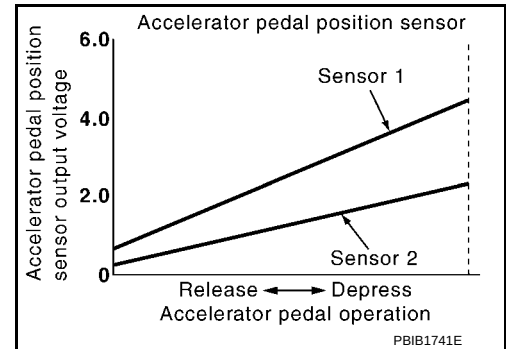
Component Description

INFOID:000000005448915

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448916

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000005448917

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to [EC-737](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (The TP sensor circuit is shorted.) • Accelerator pedal position sensor 1 and 2 • Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:000000005448918

NOTE:

DTC P2138 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-820, "Diagnosis Procedure"](#).

WITHOUT CONSULT

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to [EC-820, "Diagnosis Procedure"](#).

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

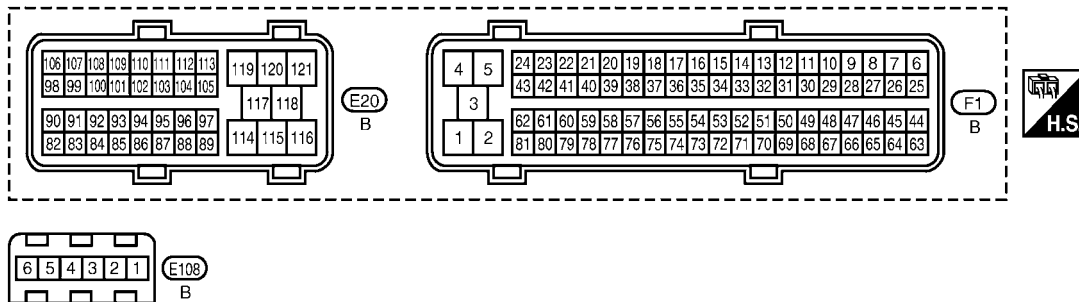
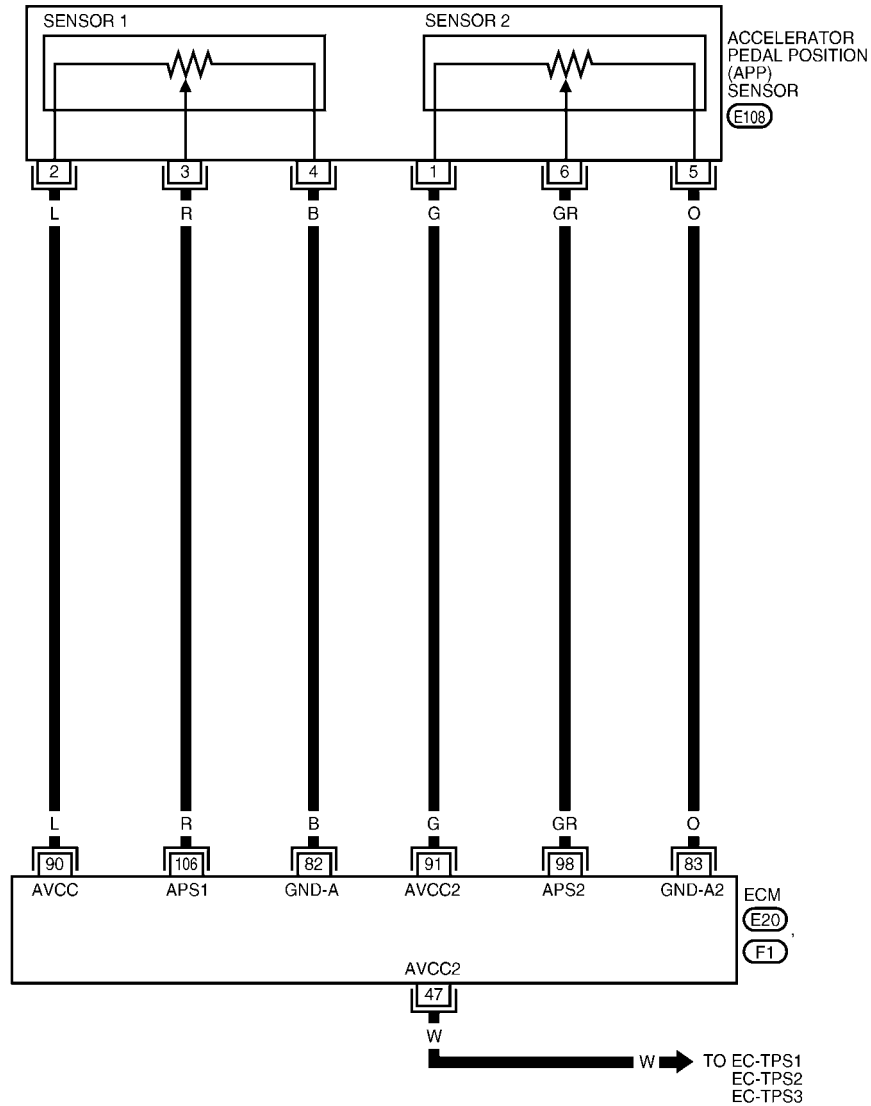
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448919

EC-APPS3-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC P2138 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

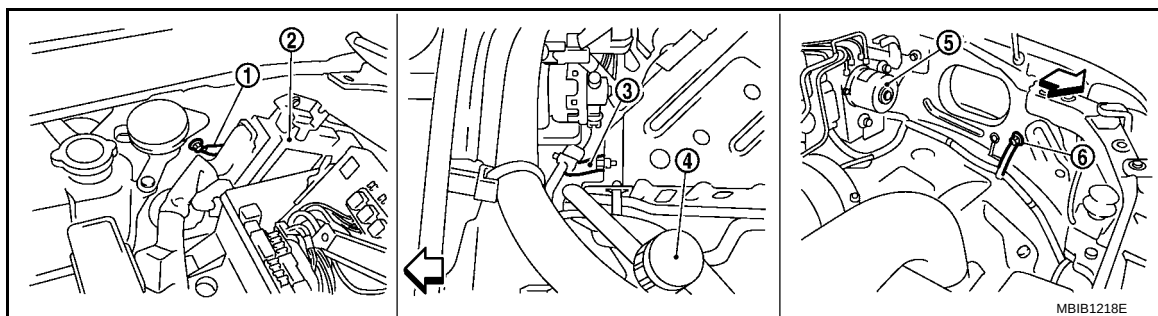
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5V
82	B	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	GR	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	Less than 4.75V

Diagnosis Procedure

INFOID:000000005448920

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

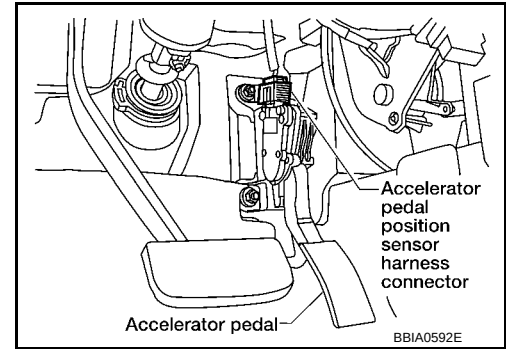
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

DTC P2138 APP SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

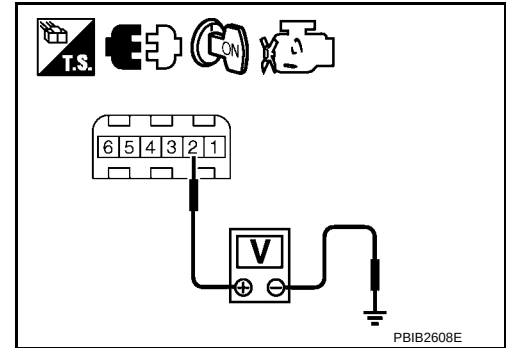


3. Check voltage between APP sensor terminal 2 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

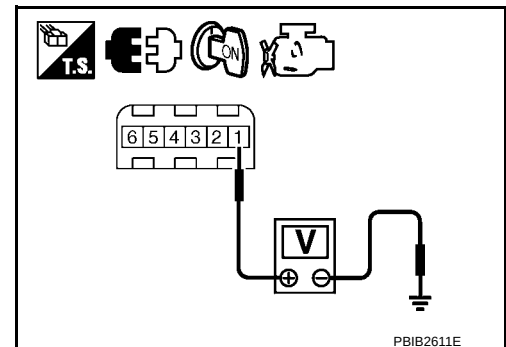
Check voltage between APP sensor terminal 1 and ground with CONSULT or tester.

- 1.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-819
47	Electric throttle control actuator terminal 2	EC-812

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK THROTTLE POSITION SENSOR

Refer to [EC-815, "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> GO TO 7.

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-566, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

8.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK APP SENSOR

Refer to [EC-823, "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

11.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-565, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-566, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-566, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

[VQ TYPE 2]

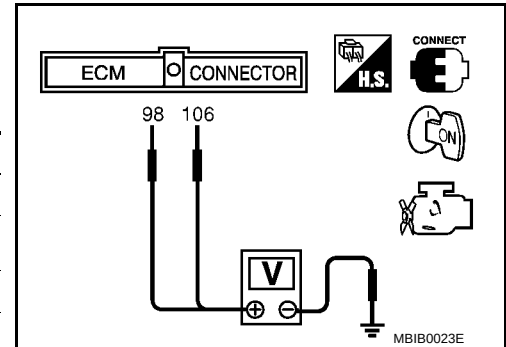
Component Inspection

INFOID:000000005448921

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-565. "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-566. "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-566. "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000005448922

ACCELERATOR PEDAL

Refer to [ACC-3](#).

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

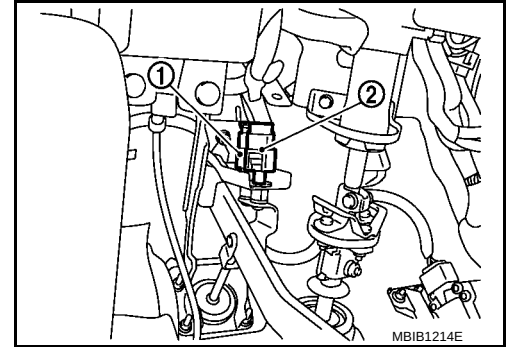
[VQ TYPE 2]

ASCD BRAKE SWITCH

Component Description

INFOID:000000005448923

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-543](#) for the ASCD function.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448924

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

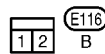
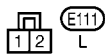
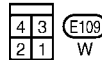
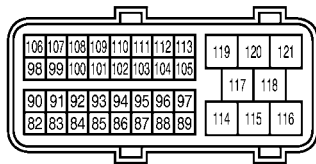
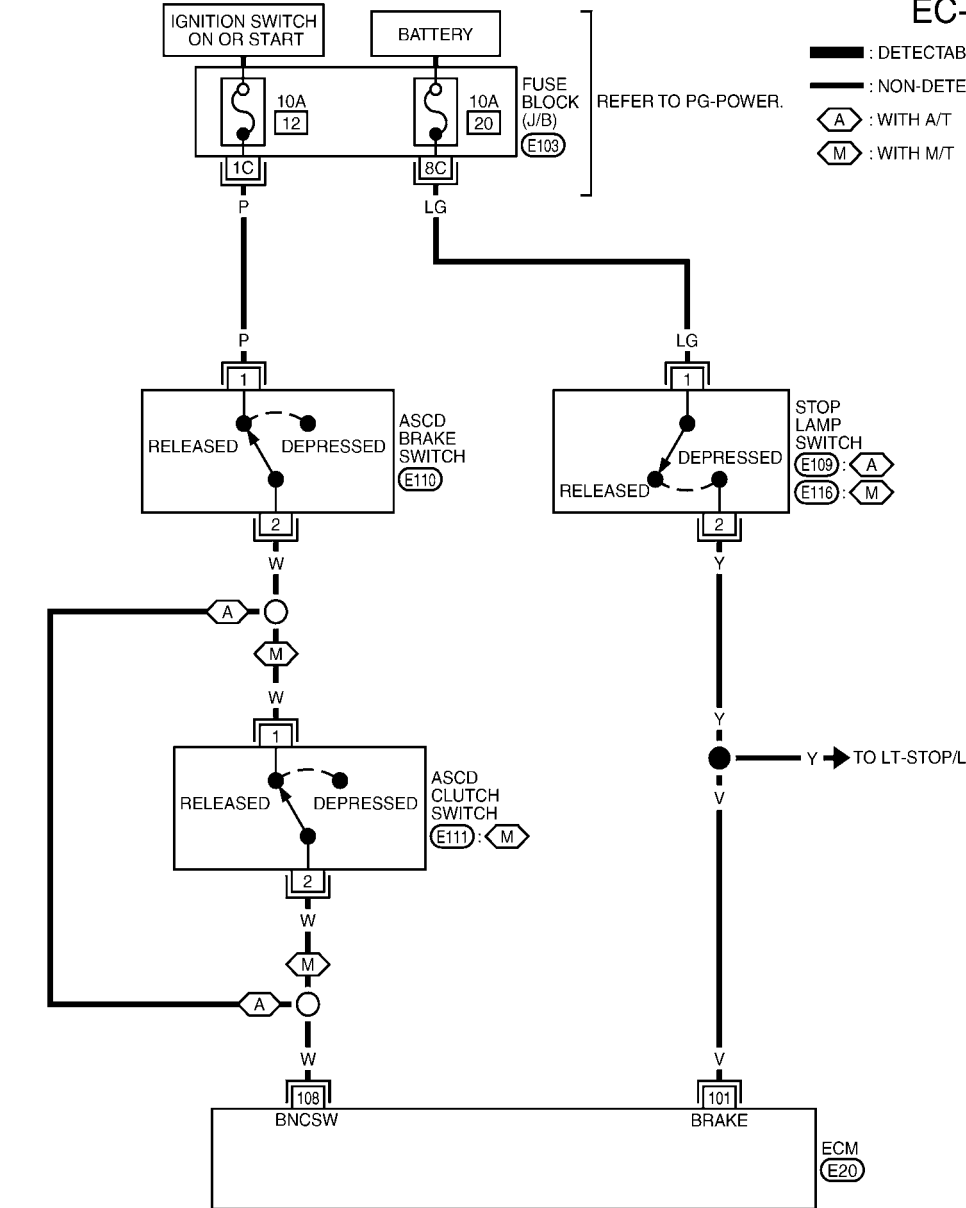
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448925

EC-ASCB0F-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC
 (A) : WITH A/T
 (M) : WITH M/T



REFER TO THE FOLLOWING.

(E103) - FUSE BLOCK - JUNCTION BOX (J/B)

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0496GB

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448926

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

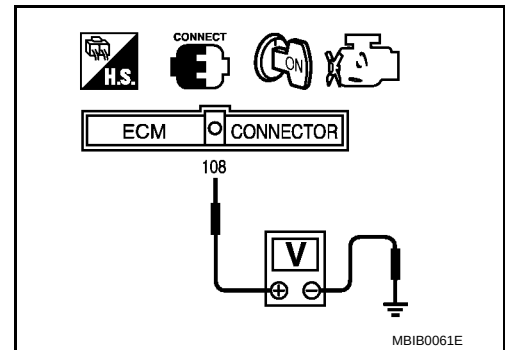
With CONSULT

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.



ASCD BRAKE SWITCH

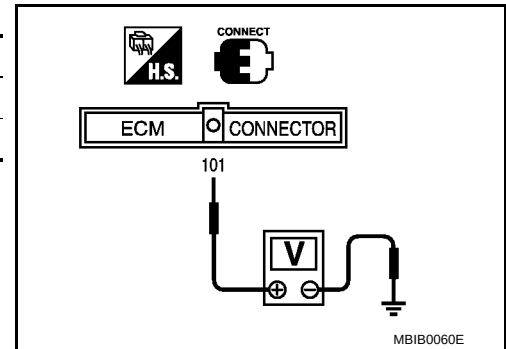
< SERVICE INFORMATION >

[VQ TYPE 2]

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

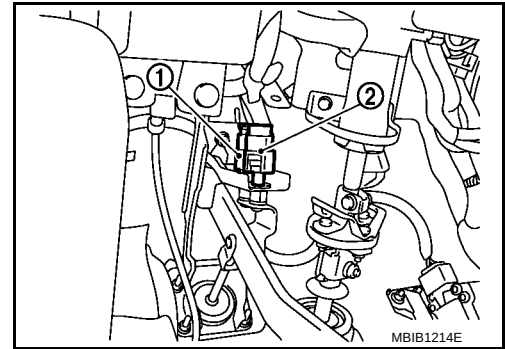
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 7.



3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
 - Stop lamp switch (2)
3. Turn ignition switch ON.

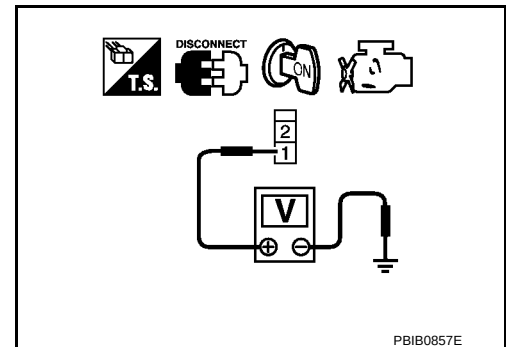


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

6.CHECK ASCD BRAKE SWITCH

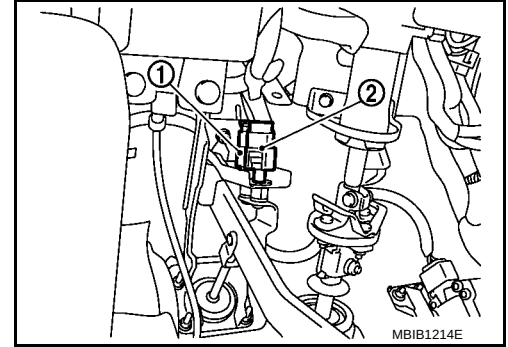
Refer to [EC-832. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.
 - ASCD brake switch (1)

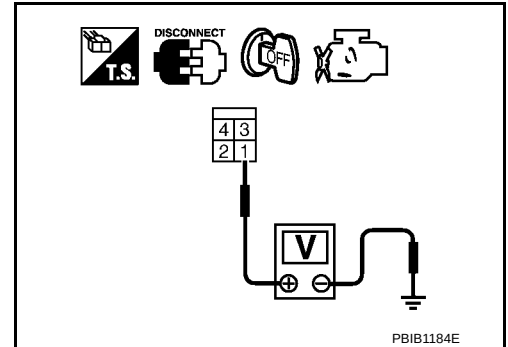


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK STOP LAMP SWITCH

Refer to [EC-832. "Component Inspection"](#)

OK or NG

- OK >> GO TO 11.
NG >> Replace stop lamp switch.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

[VQ TYPE 2]

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT

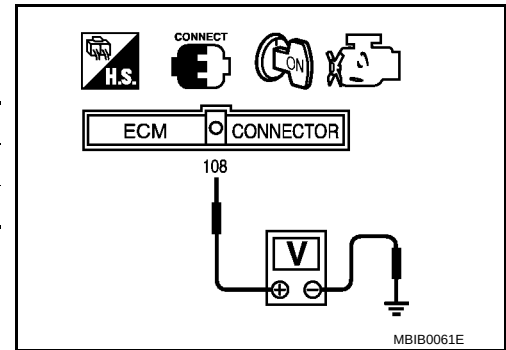
1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.

NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT

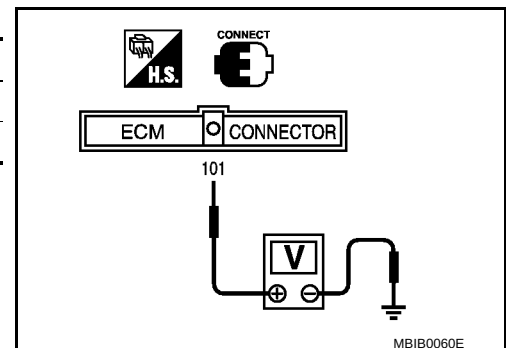
Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



ASCD BRAKE SWITCH

[VQ TYPE 2]

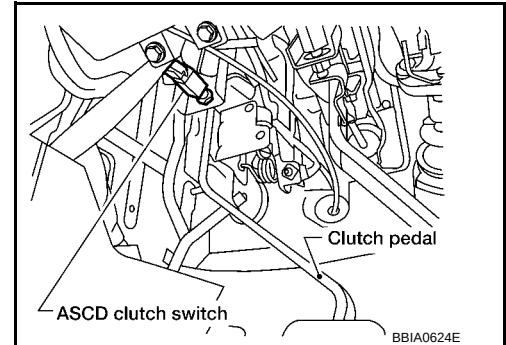
< SERVICE INFORMATION >

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 10.

3.CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

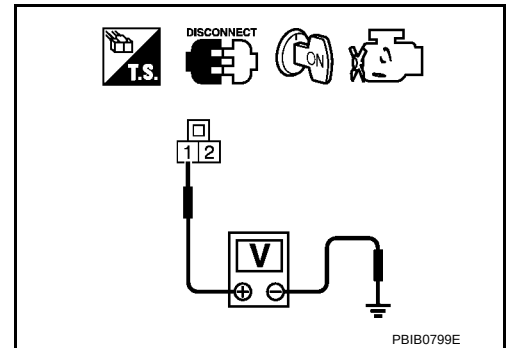


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

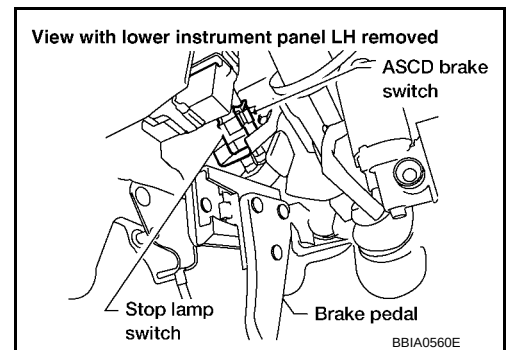
OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

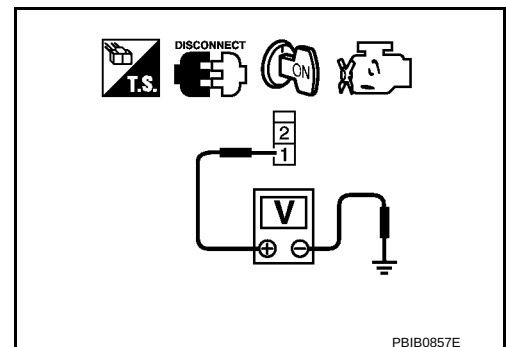


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103

ASCD BRAKE SWITCH

[VQ TYPE 2]

< SERVICE INFORMATION >

- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH

Refer to [EC-832, "Component Inspection"](#).

OK or NG

OK >> GO TO 14.

NG >> Replace ASCD brake switch.

8.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD CLUTCH SWITCH

Refer to [EC-832, "Component Inspection"](#).

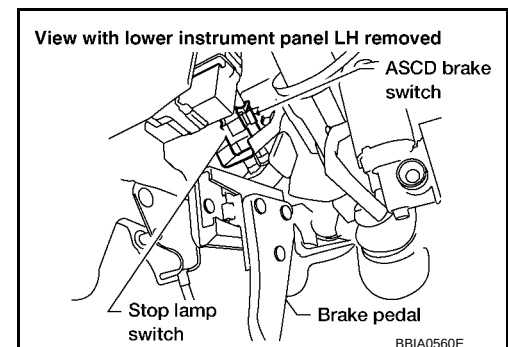
OK or NG

OK >> GO TO 14.

NG >> Replace ASCD clutch switch.

10.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



ASCD BRAKE SWITCH

[VQ TYPE 2]

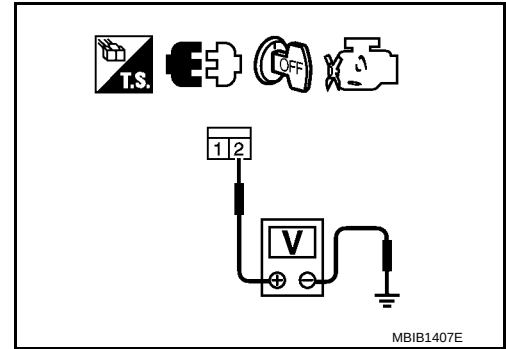
< SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 12.
- NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 13.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to [EC-832, "Component Inspection"](#).

OK or NG

- OK >> GO TO 14.
- NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448927

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

ASCD BRAKE SWITCH

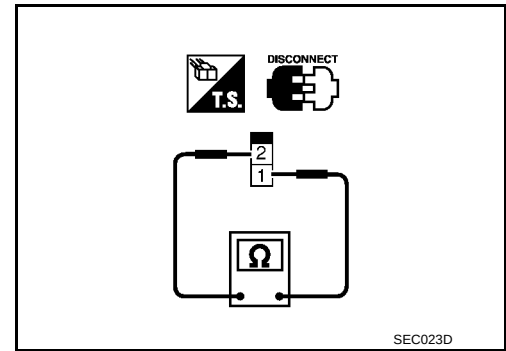
[VQ TYPE 2]

< SERVICE INFORMATION >

- Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to [BR-5](#), and perform step 3 again.

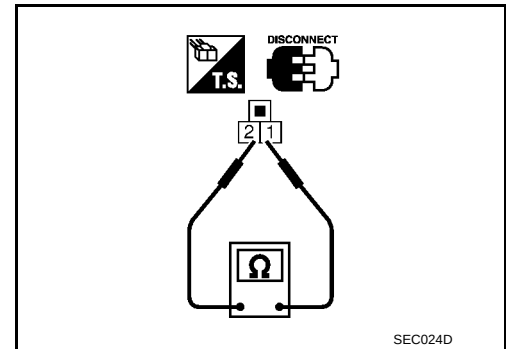


ASCD CLUTCH SWITCH

- Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

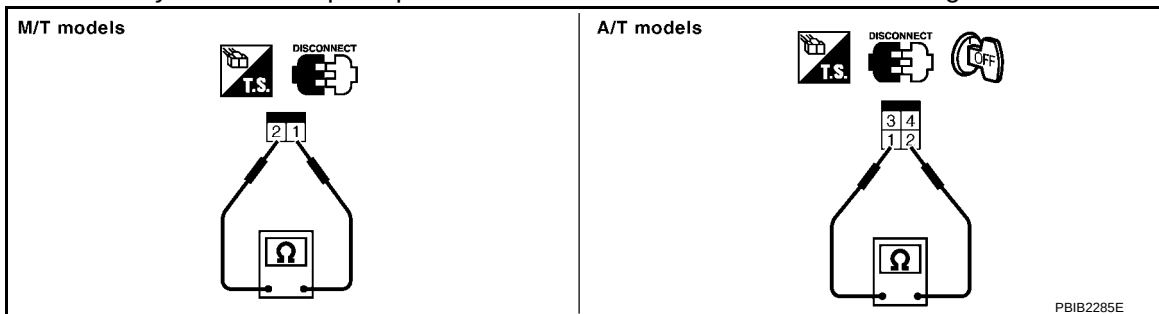
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to [CL-6](#), and perform step 3 again.



STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.

ASCD INDICATOR

Component Description

INFOID:000000005448928

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.

Refer to [EC-543](#) for the ASCD function.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448929

Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

ASC D INDICATOR

< SERVICE INFORMATION >

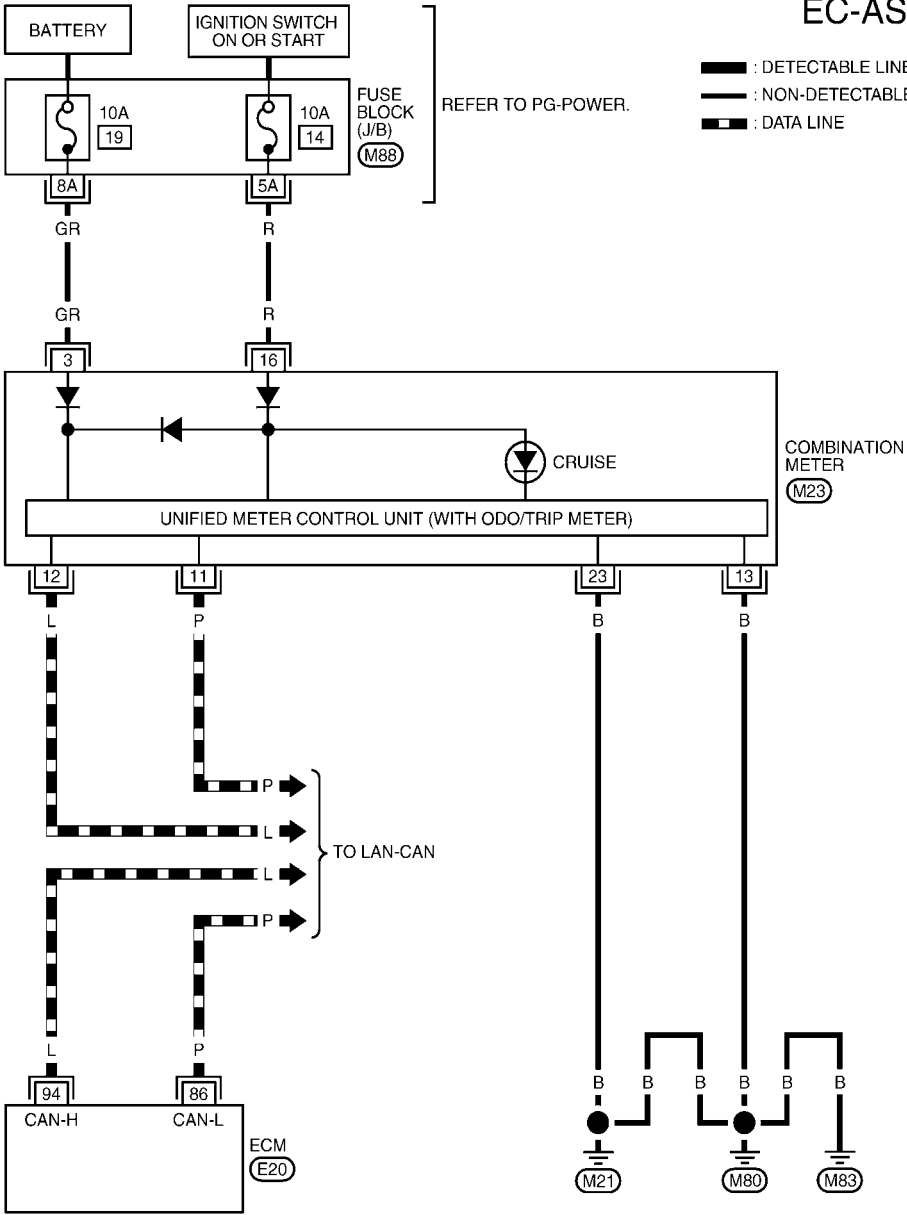
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448930

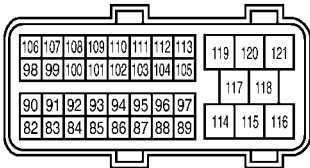
EC-ASCIND-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC
- - : DATA LINE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

(M23)
W



(E20)
B
H.S.

REFER TO THE FOLLOWING.
(M88) - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1967E

Diagnosis Procedure

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

INFOID:000000005448931

ASCD INDICATOR

< SERVICE INFORMATION >

[VQ TYPE 2]

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

2.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.

NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to [EC-629](#).

3.CHECK COMBINATION METER FUNCTION

Refer to [DI-4](#).

OK or NG

OK >> GO TO 4.

NG >> Go to [DI-4](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000005448932

The electrical load signal (Headlamp switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448933

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch and lighting switch are OFF.	OFF
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF

Diagnosis Procedure

INFOID:000000005448934

1.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

- Turn ignition switch ON.
- Connect CONSULT and select "DATA MONITOR" mode.
- Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

OK or NG

- OK >> GO TO 2.
NG >> GO TO 4.

2.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

- OK >> GO TO 3.
NG >> GO TO 5.

3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 6.

4.CHECK REAR WINDOW DEFOGGER SYSTEM

ELECTRICAL LOAD SIGNAL

[VQ TYPE 2]

< SERVICE INFORMATION >

Refer to [GW-50](#).

>> INSPECTION END

5.CHECK HEADLAMP SYSTEM

Refer to [LT-4](#).

>> INSPECTION END

6.CHECK HEATER FAN CONTROL SYSTEM

Refer to [ATC-155](#).

>> INSPECTION END

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000005448935

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ¹		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Wheel sensor	Vehicle speed* ²		

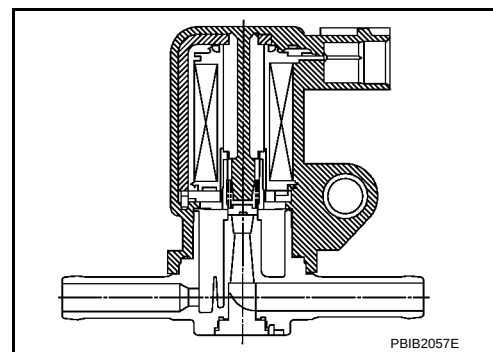
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448936

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0%
		2,000 rpm	—

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

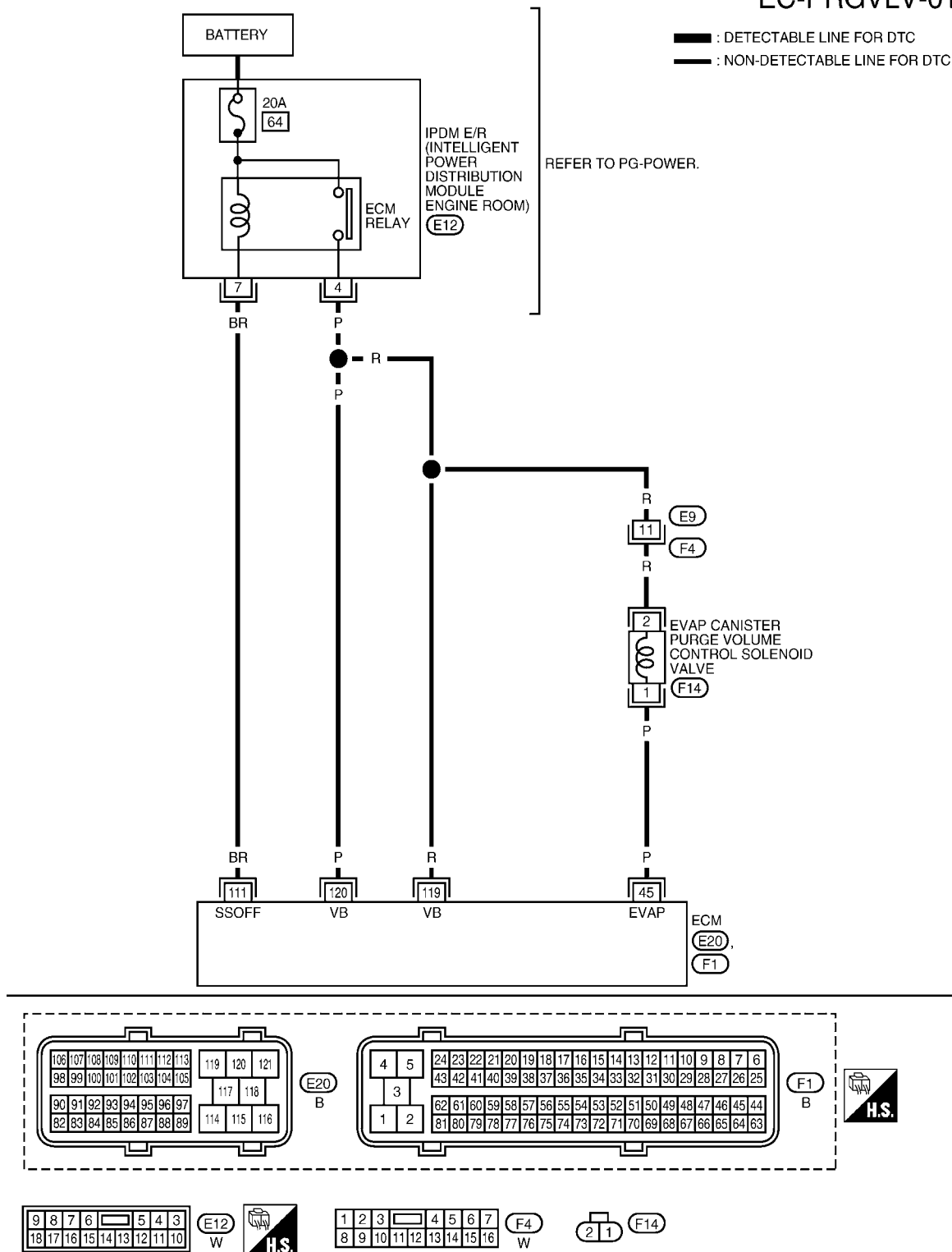
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448937

EC-PRGVLV-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0452GB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT.

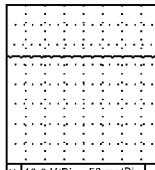
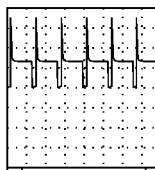
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

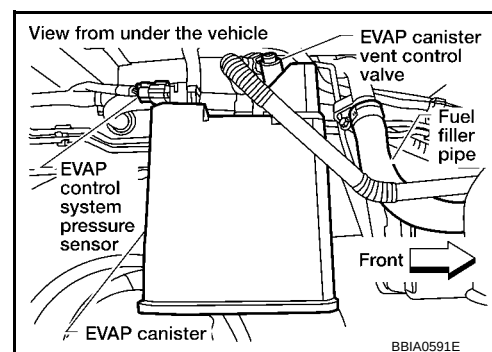
INFOID:000000005448938

1. CHECK OVERALL FUNCTION

With CONSULT

- Turn ignition switch OFF.
- Disconnect the EVAP purge hose connected to the EVAP canister.
- Turn ignition switch ON.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Start engine and let it idle.
- Change the valve opening percentage with touching "Qu" or "Qd" on CONSULT screen, and check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions (PURG VOL CONT/V)	Vacuum
0%	Should not exist.
100%	Should exist.



Without CONSULT

- Turn ignition switch OFF.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Start engine and let it idle for at least 100 seconds.
4. Check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions	Vacuum
At idle	Should not exist.
Engine speed: About 2,000 rpm.	Should exist.

OK or NG

- OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK EVAP CANISTER

Refer to [EC-548, "Component Inspection"](#).

OK or NG

- OK >> **INSPECTION END**
NG >> Replace EVAP canister.

3.CHECK EVAP PURGE LINE

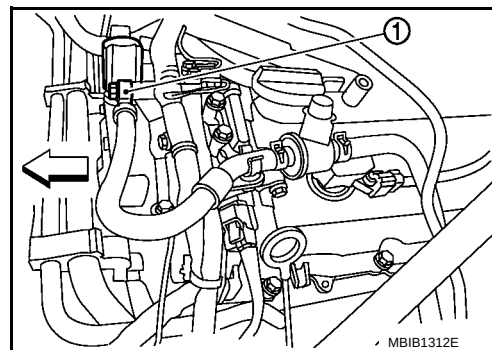
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to [EC-546, "Description"](#).

OK or NG

- OK >> GO TO 4.
NG >> Repair or reconnect the hose.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
- ⇐: Vehicle front
3. Turn ignition switch ON.

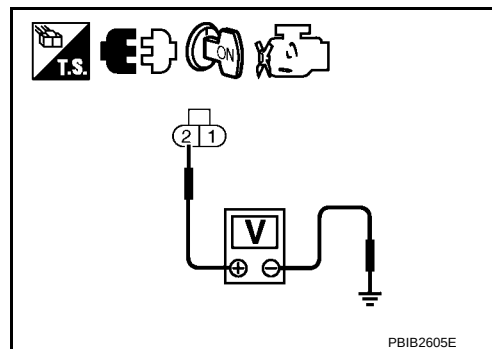


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 6.
NG >> GO TO 5.



5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

>> Repair harness or connectors.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT)>>GO TO 7.

OK (Without CONSULT)>>GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness connectors.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

 **With CONSULT**

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 9.

NG >> GO TO 8.

8.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-843. "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace EVAP canister purge volume control solenoid valve.

9.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

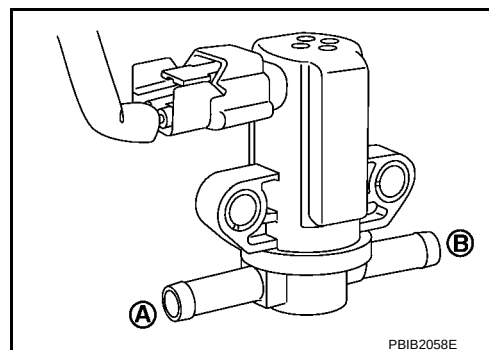
INFOID:000000005448939

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **With CONSULT**

Check air passage continuity of EVAP canister purge volume control solenoid valve using "ACTIVE TEST" mode with CONSULT under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No



 **Without CONSULT**

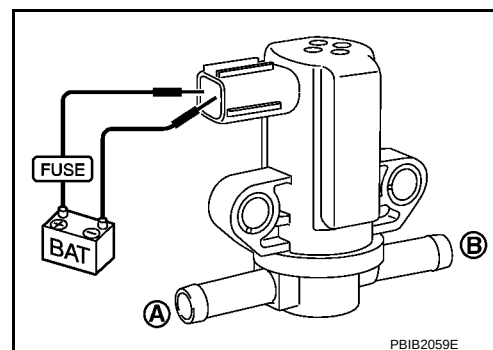
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VQ TYPE 2]

< SERVICE INFORMATION >

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:000000005448940

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-18](#).

EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

EVAP CANISTER VENT CONTROL VALVE

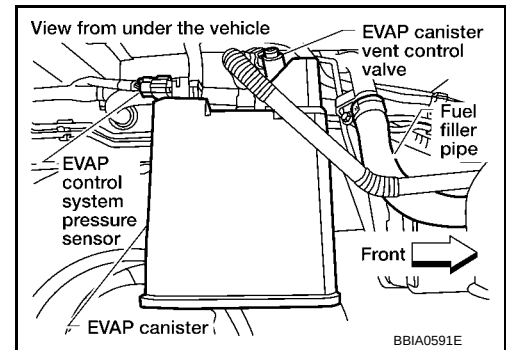
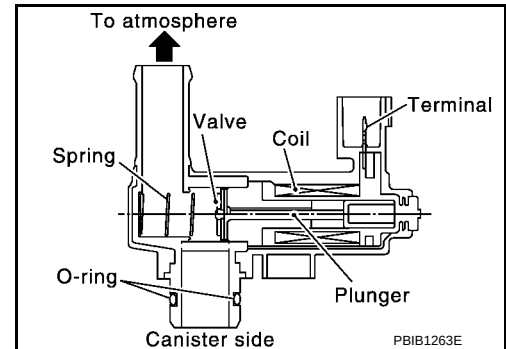
Component Description

INFOID:000000005448941

The EVAP canister vent control valve is located on the EVAP canister.

This solenoid valve is not used for engine control, and always remains open.

If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressured and EVAP canister may be damaged.



EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

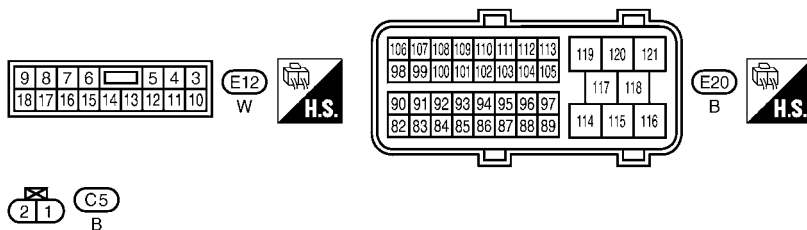
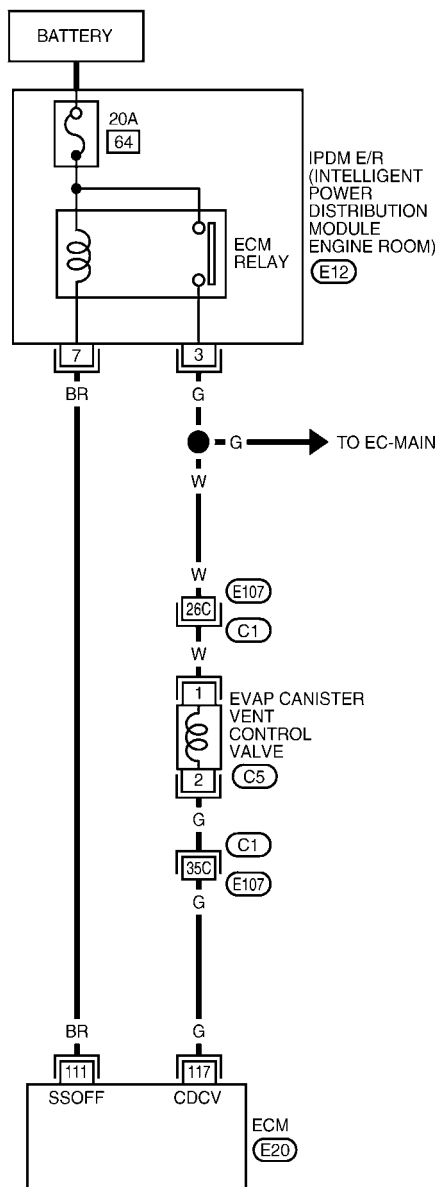
Wiring Diagram

INFOID:000000005448942

EC-VENT-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC

REFER TO PG-POWER.



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0445GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VQ TYPE 2]

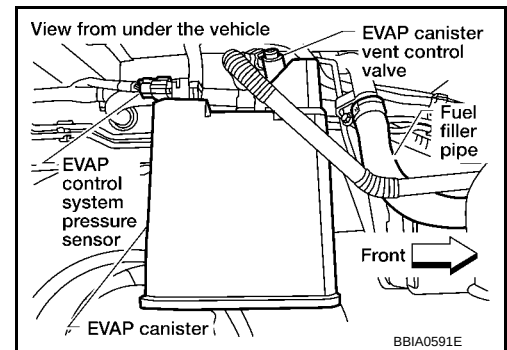
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	G	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000005448943

1.CHECK OVERALL FUNCTION

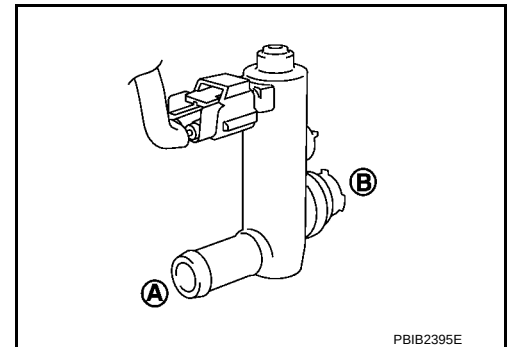
- Turn ignition switch OFF.
- Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
- Start engine.



- Blow air into port **A** and check that it flows freely out of port **B**.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



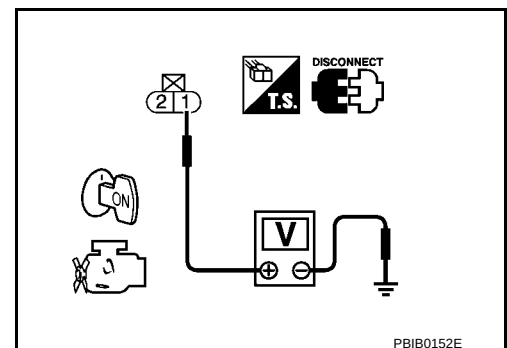
2.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- Disconnect EVAP canister vent control valve harness connector.
- Turn ignition switch ON.
- Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

EVAP CANISTER VENT CONTROL VALVE

[VQ TYPE 2]

< SERVICE INFORMATION >

Check the following.

- Harness connectors E107, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-848. "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> Replace EVAP canister vent control valve.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

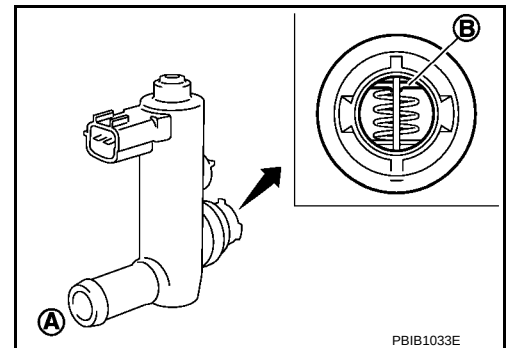
>> **INSPECTION END**

Component Inspection

INFOID:000000005448944

EVAP CANISTER VENT CONTROL VALVE

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



EVAP CANISTER VENT CONTROL VALVE

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

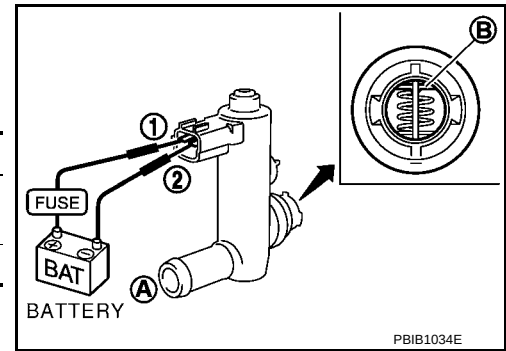
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.

If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

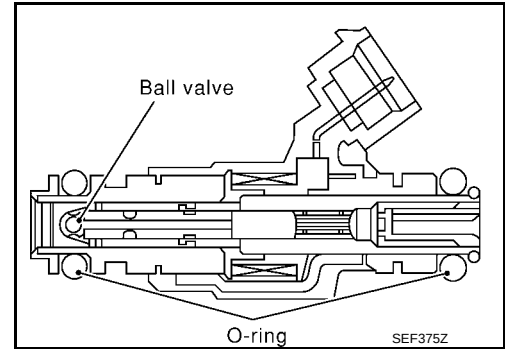


FUEL INJECTOR

Component Description

INFOID:000000005448945

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448946

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-612 .		
INJ PULSE-B1 INJ PULSE-B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

FUEL INJECTOR

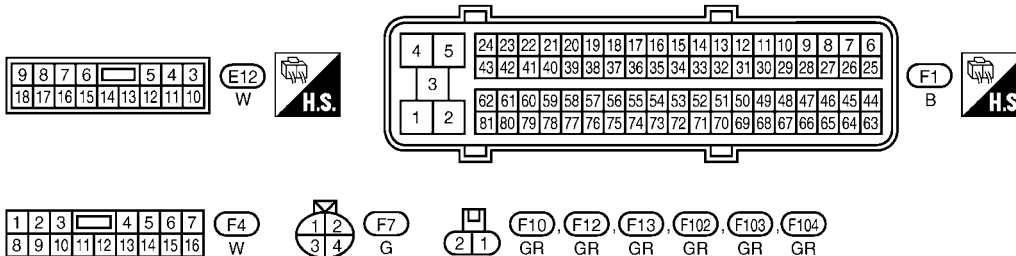
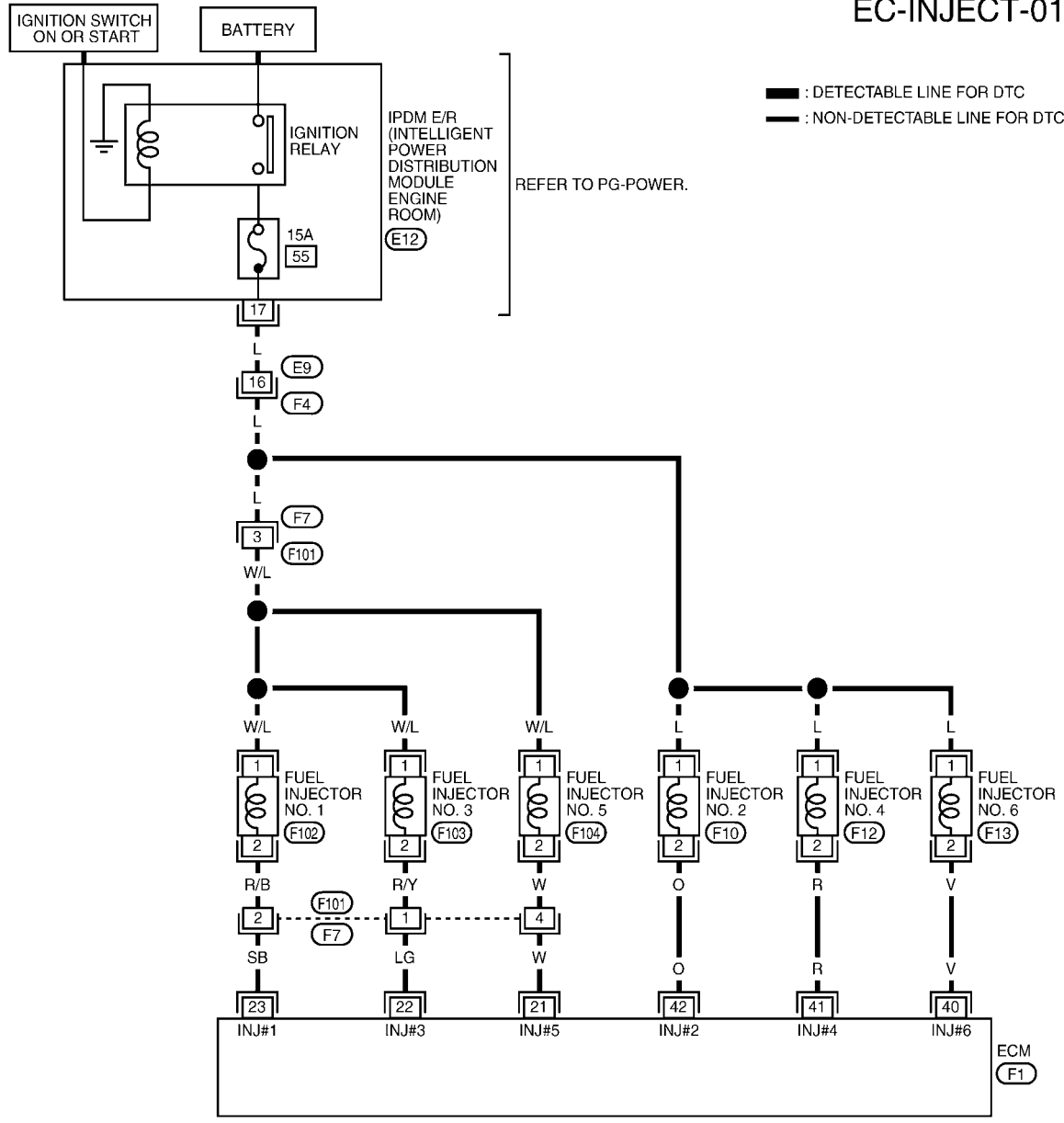
< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448947

EC-INJECT-01



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

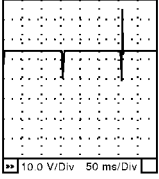
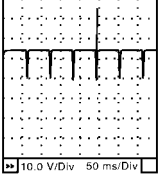
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

FUEL INJECTOR

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	W	Fuel injector No. 5	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
22	LG	Fuel injector No. 3		
23	SB	Fuel injector No. 1		
40	V	Fuel injector No. 6	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
41	R	Fuel injector No. 4		
42	O	Fuel injector No. 2		

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448948

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

Yes or No

Yes (With CONSULT)>>GO TO 2.

Yes (Without CONSULT)>>GO TO 3.

No >> GO TO 7.

2.CHECK OVERALL FUNCTION

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

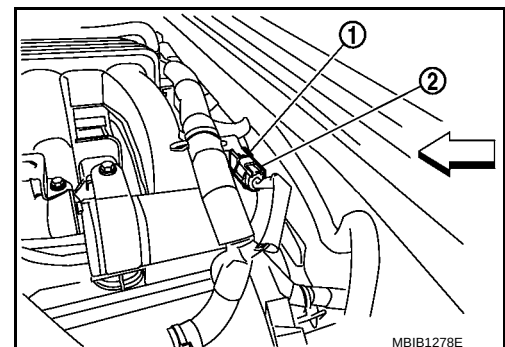
OK >> **INSPECTION END**

NG >> GO TO 7.

3.CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT

1. Stop engine.
2. Disconnect harness connector F101 (1), F7 (2).
- ⇐: Vehicle front
3. Turn ignition switch ON.



FUEL INJECTOR

[VQ TYPE 2]

< SERVICE INFORMATION >

- Check voltage between harness connector F7 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between harness connector F7 and ECM as follows.
Refer to Wiring Diagram.

Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between harness connector F7 and fuse
- Harness for open or short between harness connector F7 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(-)
1	3	2
3	3	1
5	3	4

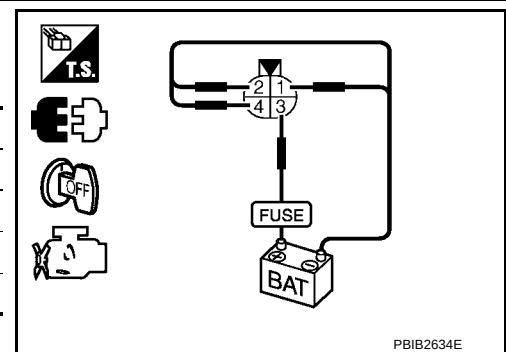
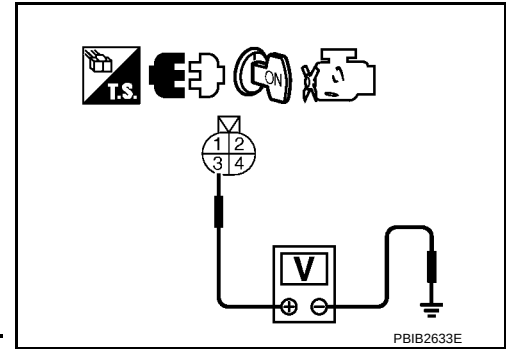
Operating sound should exist.

OK or NG

- OK >> GO TO 6.
NG >> GO TO 7.

6.CHECK FUNCTION OF FUEL INJECTOR-III

- Reconnect all harness connector disconnected.
- Start engine.



FUEL INJECTOR

[VQ TYPE 2]

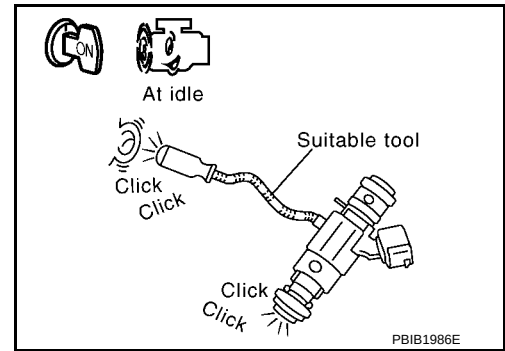
< SERVICE INFORMATION >

- Listen to fuel injectors No. 2, No. 4, No.6 operating sound.

Clicking noise should exist.

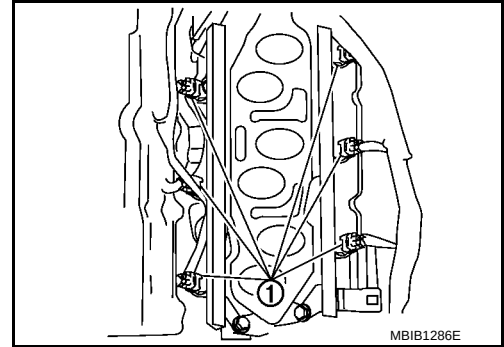
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 7.



7. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector (1).

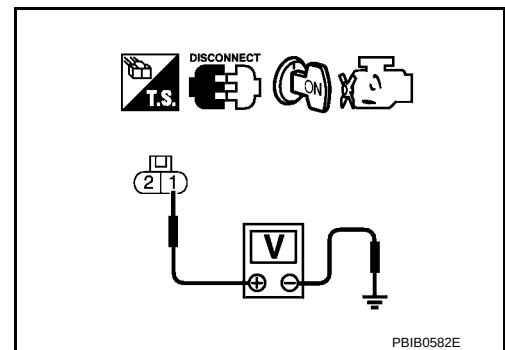


- Turn ignition switch ON.
- Check voltage between fuel injector terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F7, F101
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

9. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between fuel injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

- Also check harness for short to ground and short to power.

OK or NG

FUEL INJECTOR

[VQ TYPE 2]

< SERVICE INFORMATION >

- OK >> GO TO 11.
- NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F101, F7 (bank 1)
- Harness for open or short between fuel injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK FUEL INJECTOR

Refer to [EC-855, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Replace fuel injector.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

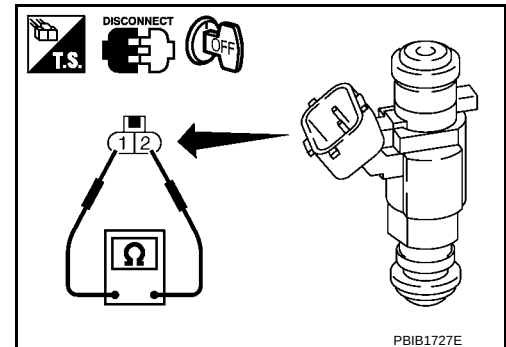
Component Inspection

INFOID:000000005448949

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



INFOID:000000005448950

Removal and Installation

FUEL INJECTOR

Refer to [EM-36](#).

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 2]

FUEL PUMP

Description

INFOID:000000005448951

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

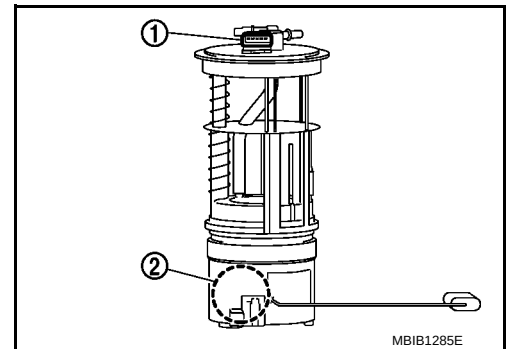
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)



CONSULT Reference Value in Data Monitor Mode

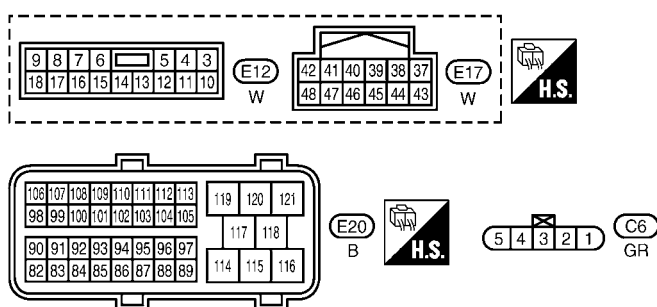
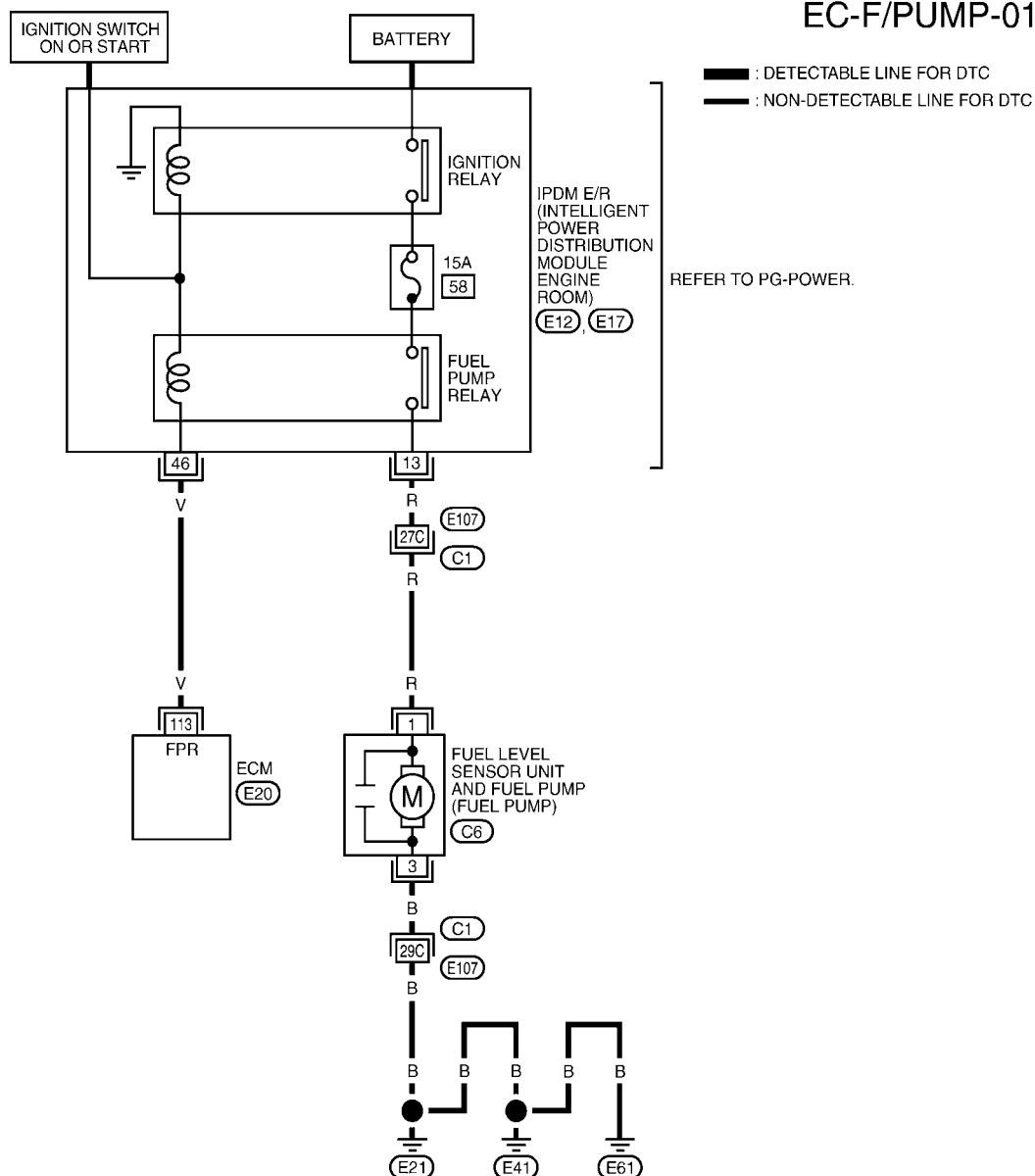
INFOID:000000005448952

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking	ON
	• Except above conditions	OFF

Wiring Diagram

INFID:0000000005448953



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON	0 - 1.5V
			[Engine is running] [Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

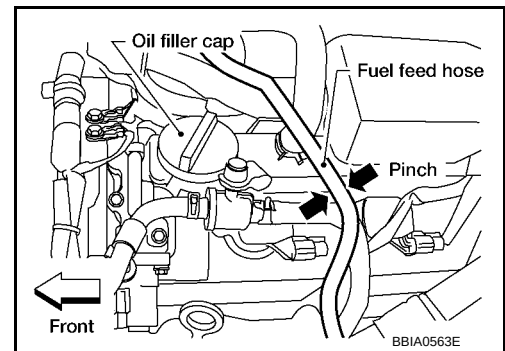
INFOID:000000005448954

1.CHECK OVERALL FUNCTION

- Turn ignition switch ON.
- Pinch fuel feed hose with two fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



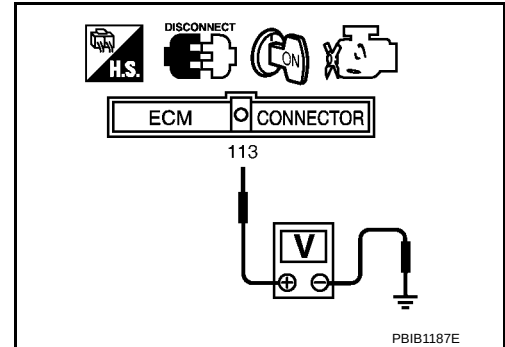
2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Turn ignition switch ON.
- Check voltage between ECM terminal 113 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



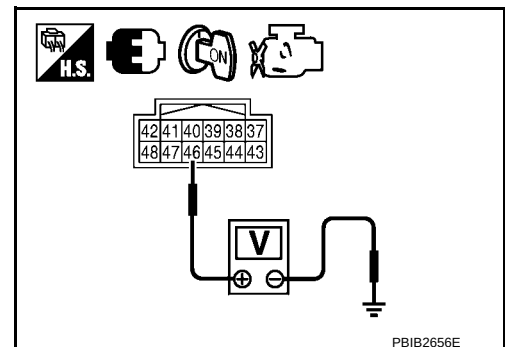
3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 12.



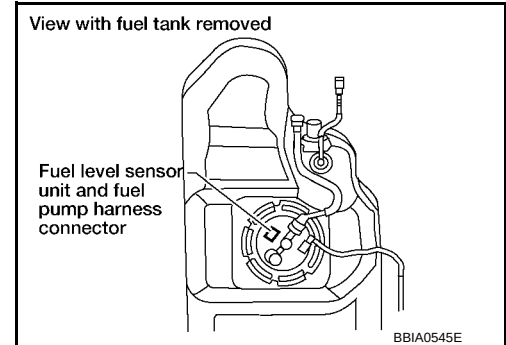
4.DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
4. Turn ignition switch ON.

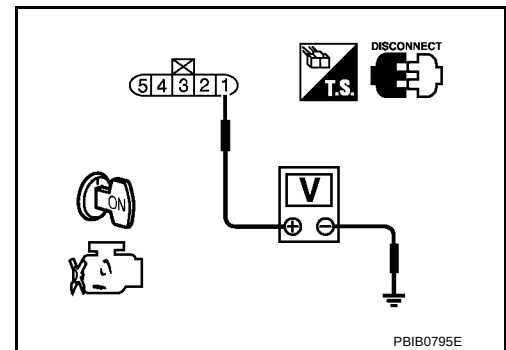


5. Check voltage between "fuel level sensor unit and fuel pump" terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

- OK >> GO TO 9.
NG >> GO TO 6.



6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

- OK >> GO TO 7.
NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CURCUIT-IV

1. Disconnect IPDM E/R harness connector E12.
2. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 1 and IPDM E/R terminal 13.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 12.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between "fuel level sensor unit and fuel pump" and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

FUEL PUMP

< SERVICE INFORMATION >

[VQ TYPE 2]

1. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 3 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground.

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between "fuel level sensor unit and fuel pump" and ground

>> Repair open circuit or short to power in harness or connectors.

11.CHECK FUEL PUMP

Refer to [EC-860, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Replace fuel pump.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> Replace IPDM E/R.
- NG >> Repair or replace harness or connectors.

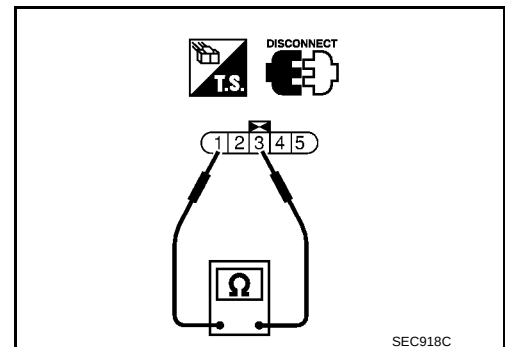
Component Inspection

INFOID:000000005448955

FUEL PUMP

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Check resistance between "fuel level sensor unit and fuel pump" terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]



Removal and Installation

INFOID:000000005448956

FUEL PUMP

Refer to [FL-11](#).

HO2S2

Component Description

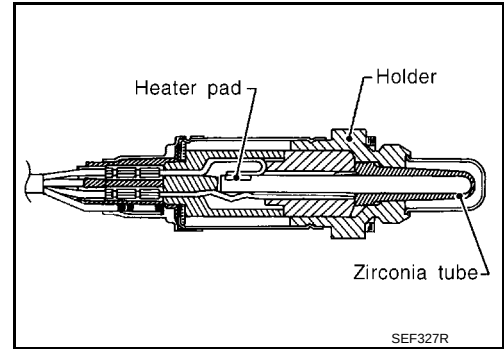
INFOID:000000005448957

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448958

Specification data are reference values.

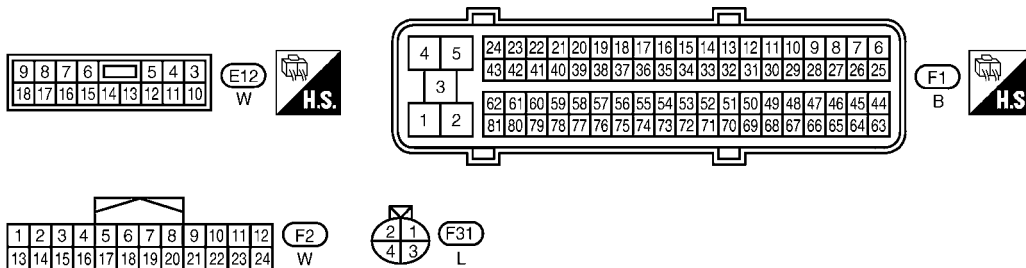
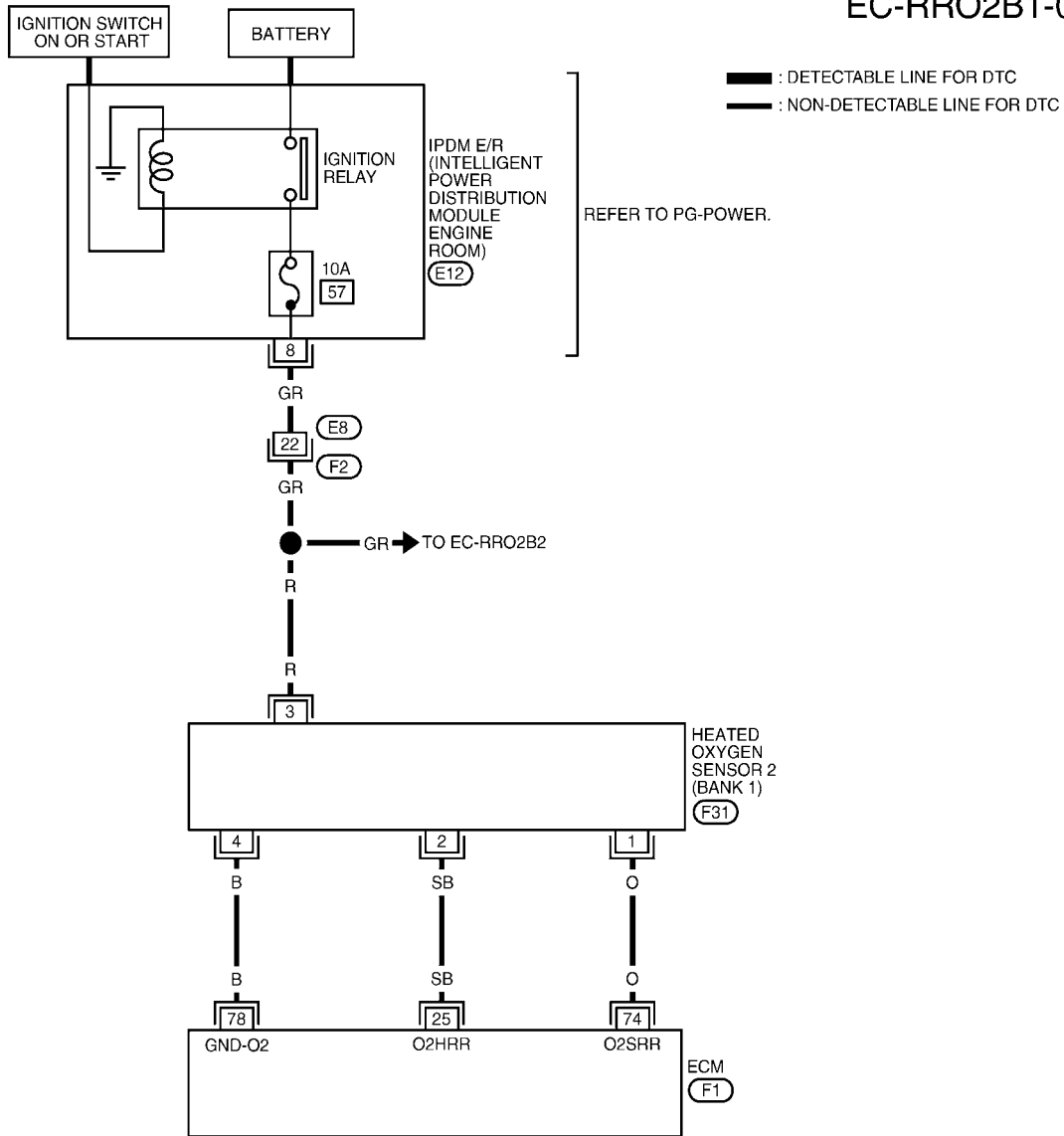
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	- Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	LEAN $\longleftrightarrow$ RICH

Wiring Diagram

INFOID:000000005448959

BANK 1

EC-RRO2B1-01



JMBWA1224GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

HO2S2

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

A

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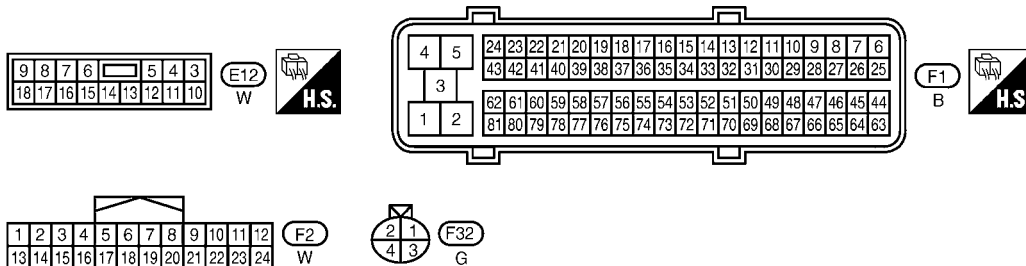
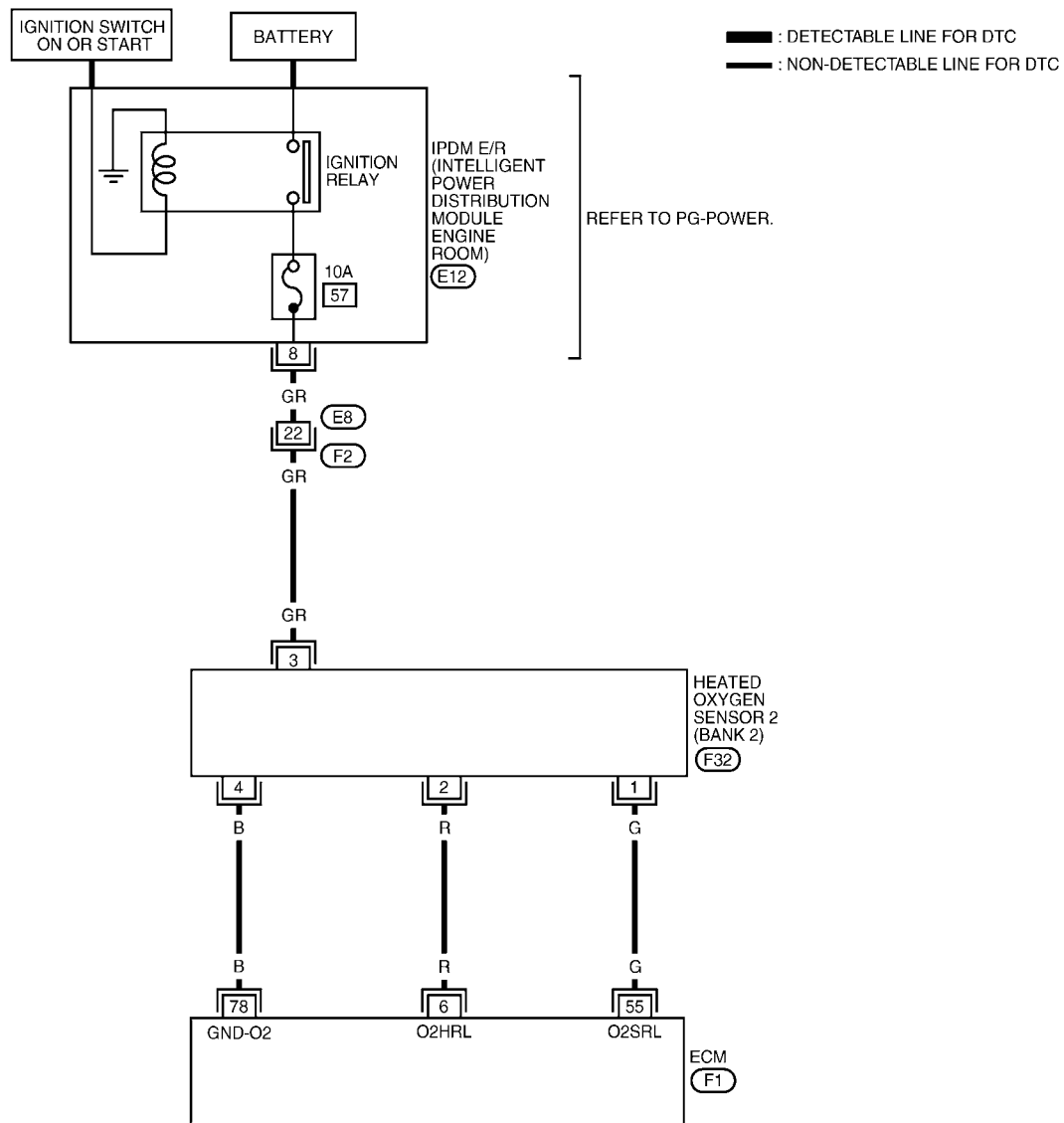
N

O

P

BANK 2

EC-RRO2B2-01



JMBWA1225GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448960

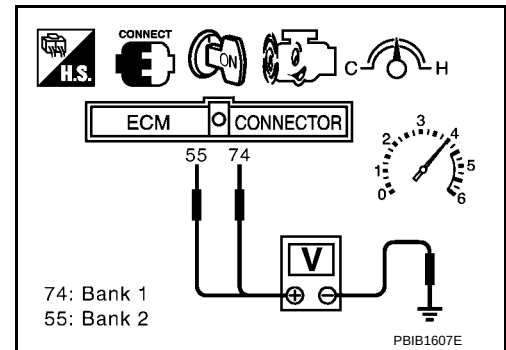
1. CHECK OVERALL FUNCTION - I

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
- Check the voltage while revving engine up to 4,000 rpm under no load at least 10 times.
(Depress and release the accelerator pedal as quickly as possible.)

The voltage does not remain in the range of 0.2 - 0.4V

OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.



2. CHECK OVERALL FUNCTION - II

Keep engine at idle for 10 minutes, then check the voltage between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground, or check the voltage when coasting at 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).

The voltage does not remain in the range of 0.2 - 0.4V

OK or NG

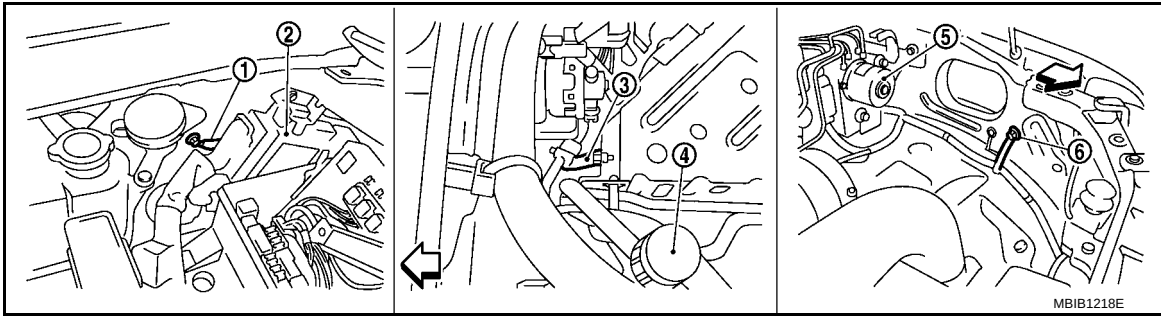
- OK >> **INSPECTION END**
 NG >> GO TO 3.

3. RETIGHTEN GROUND SCREWS

- Turn ignition switch OFF.

< SERVICE INFORMATION >

2. Loosen and retighten three ground screws on the body.
Refer to [EC-627, "Ground Inspection"](#).



← : Vehicle front

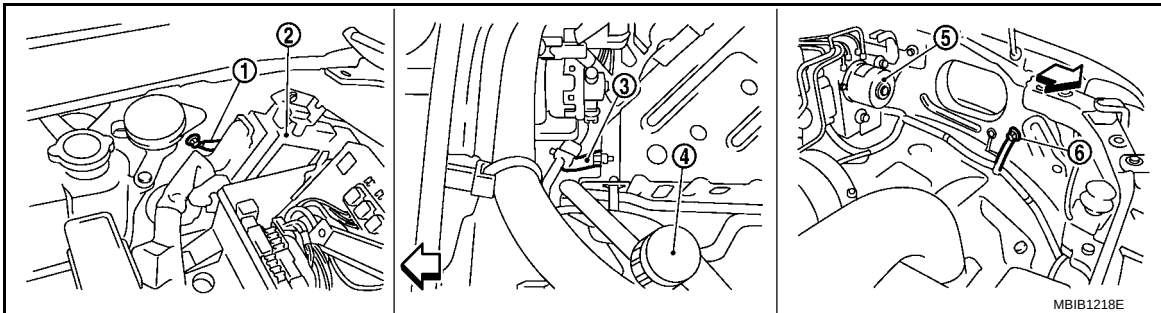
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK >> GO TO 4.

NG >> Repair or replace ground connections.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
 2. Heated oxygen sensor 2 (bank 2) harness connector
 3. Heated oxygen sensor 2 (bank 1) harness connector
 4. Heated oxygen sensor 2 (bank 1)
3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

Continuity should exist.

3. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

Continuity should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-867, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448961

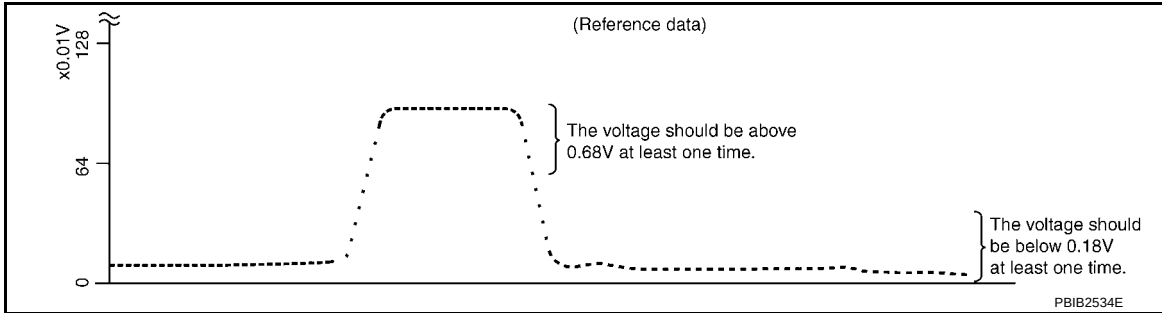
HEATED OXYGEN SENSOR 2

⑧ With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

< SERVICE INFORMATION >

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

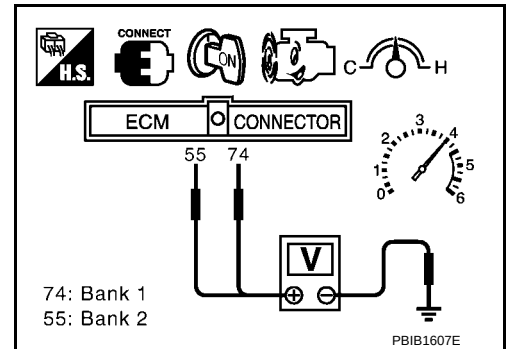
"HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.68V at least once during this procedure.
If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).
The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.

Removal and Installation

INFOID:000000005448962

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

HO2S2 HEATER

Description

INFOID:000000005448963

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448964

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed is below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	Engine speed: Above 3,600 rpm	OFF

HO2S2 HEATER

< SERVICE INFORMATION >

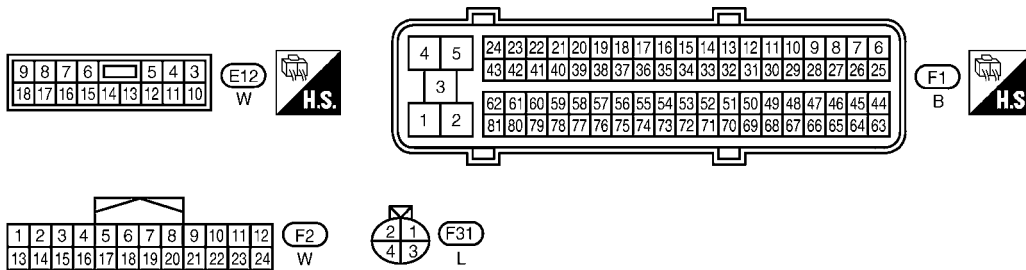
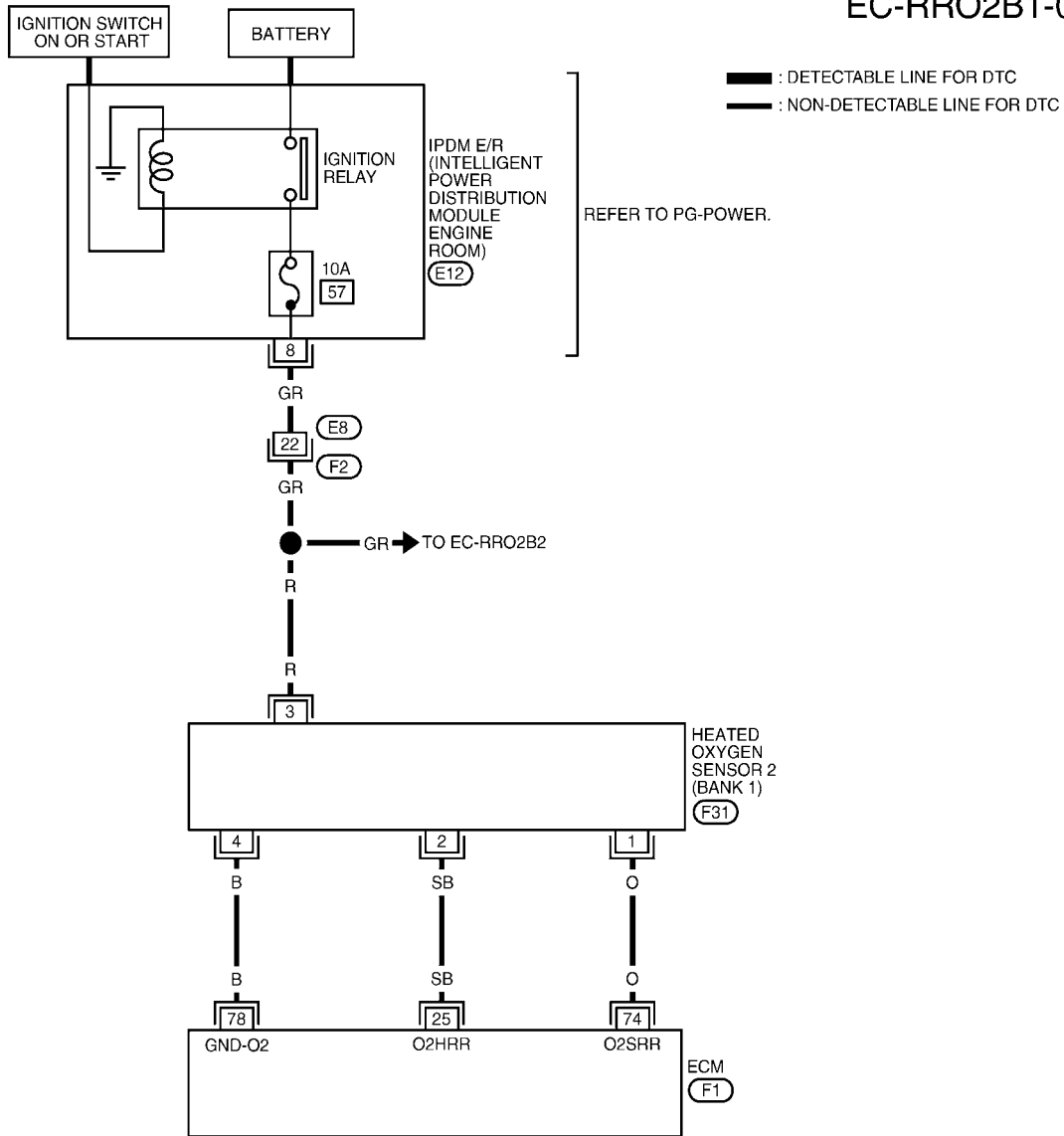
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448965

BANK 1

EC-RRO2B1-01



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA1224GB

HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

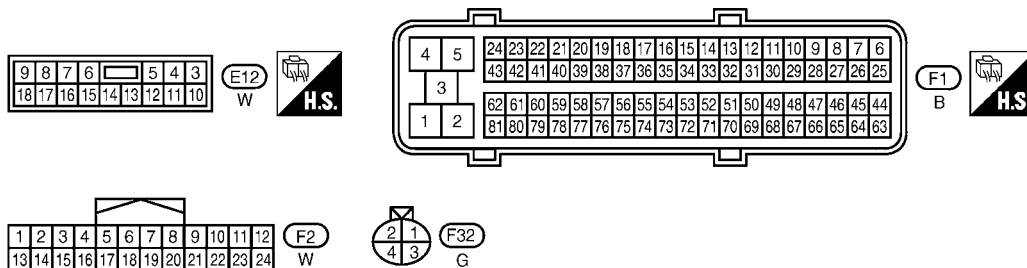
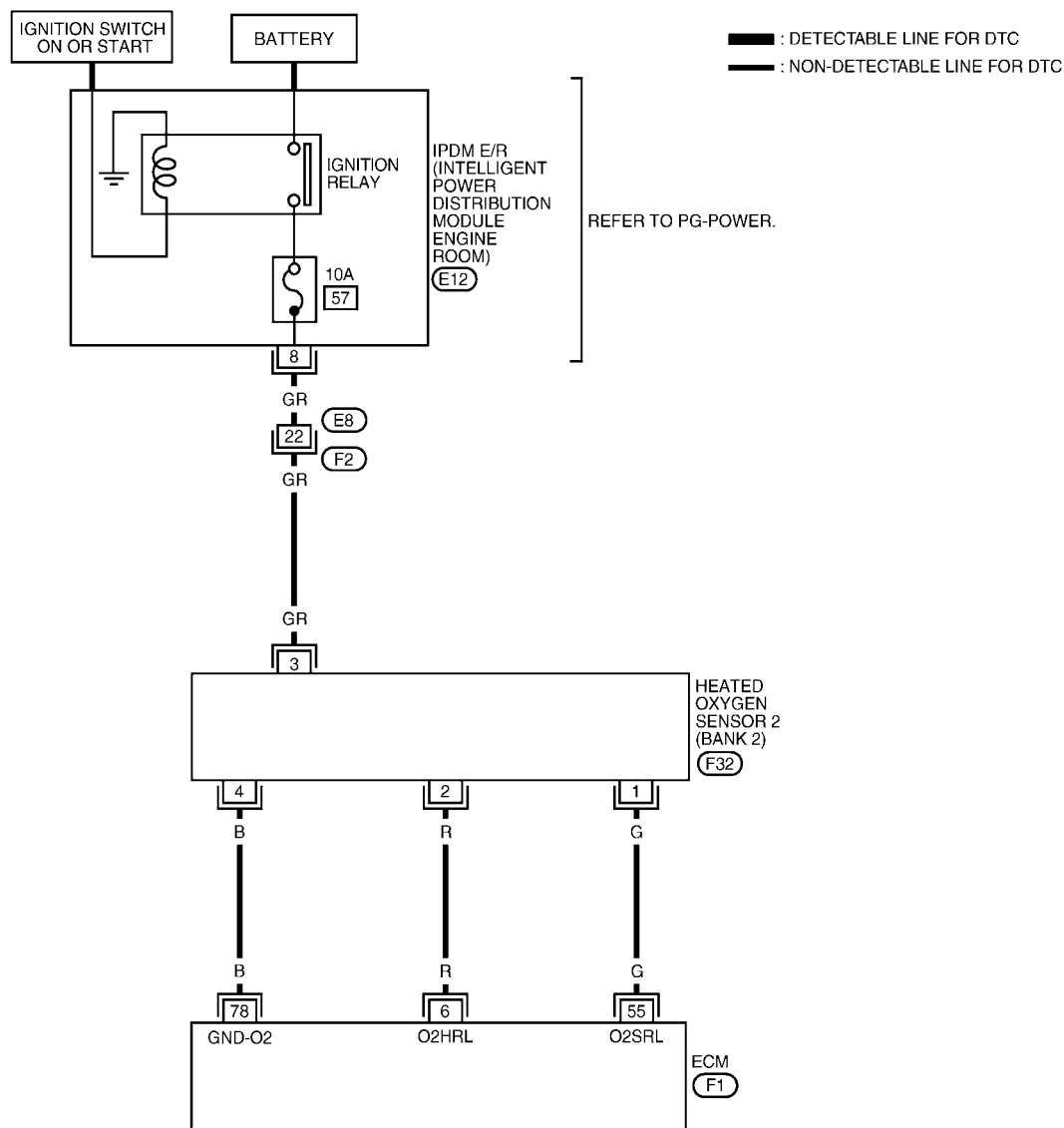
HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

BANK 2

EC-RRO2B2-01



JMBWA1225GB

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	[Engine is running] - Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] - Engine: Stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	[Engine is running] Warm-up condition - Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000005448966

1.CHECK OVERALL FUNCTION CHECK

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Set voltmeter probes between ECM terminal 25 [HO2S2 (B1) heater signal] or 6 [HO2S2 (B2) heater signal] and ground.
- Check the voltage under the following conditions.

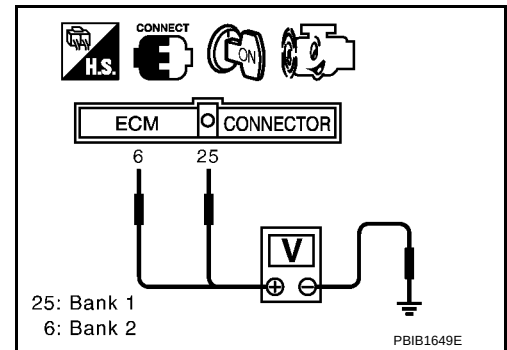
Conditions	Voltage
At idle	0 - 1V
Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.

2.CHECK GROUND CONNECTIONS

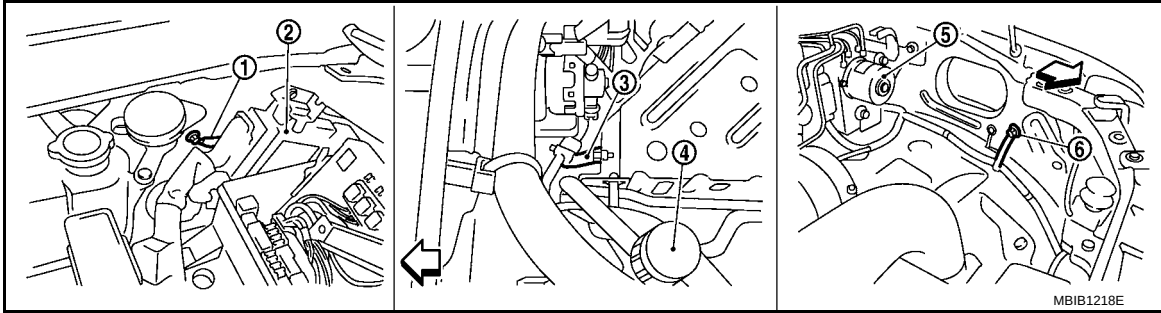
- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body. Refer to [EC-627, "Ground Inspection"](#).



HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]



⇐ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

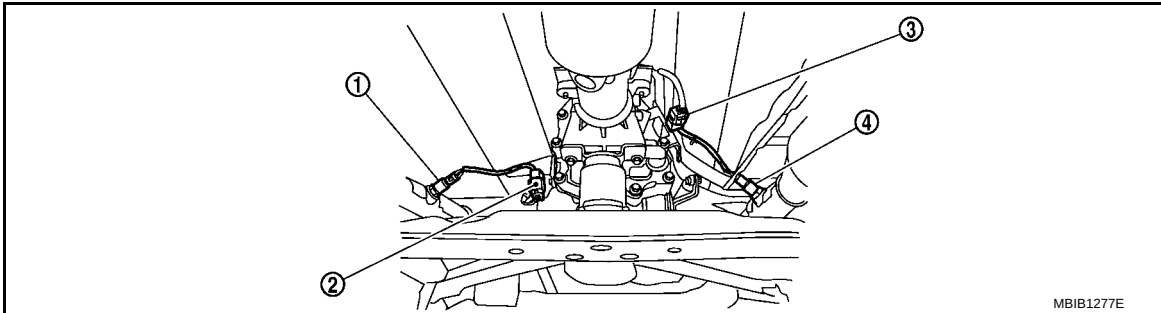
OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

3.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)	2. Heated oxygen sensor 2 (bank 2) harness connector	3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank1)		

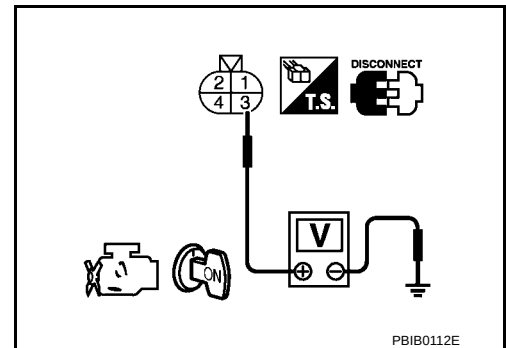
2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

HO2S2 HEATER

< SERVICE INFORMATION >

[VQ TYPE 2]

5.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
25	2	1
6	2	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-875. "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor 2.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448967

HEATED OXYGEN SENSOR 2 HEATER

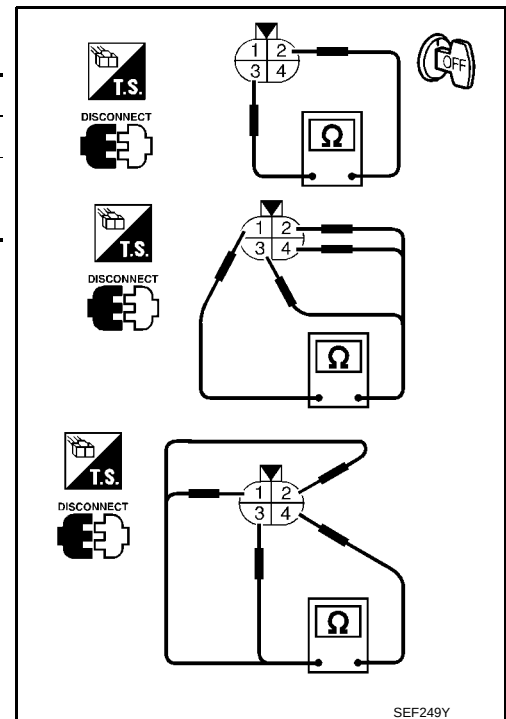
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	9.9 - 13.3 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$
4 and 1, 2, 3	(Continuity should not exist)

2. If NG, replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.



SEF249Y

Removal and Installation

INFOID:000000005448968

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

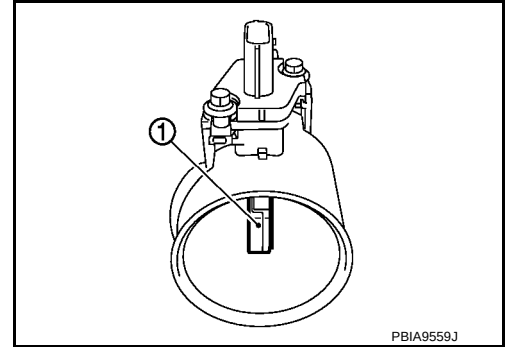
IAT SENSOR

Component Description

INFOID:000000005448969

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



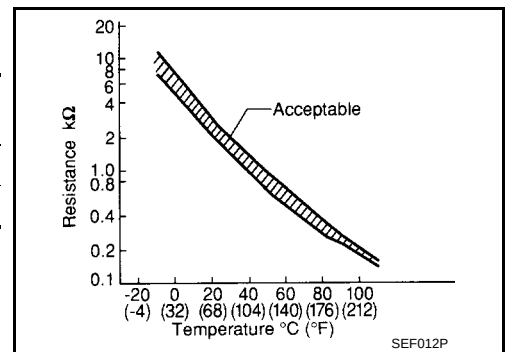
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



IAT SENSOR

< SERVICE INFORMATION >

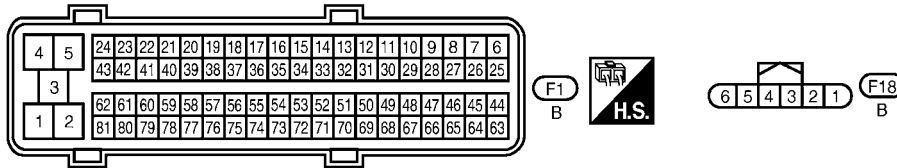
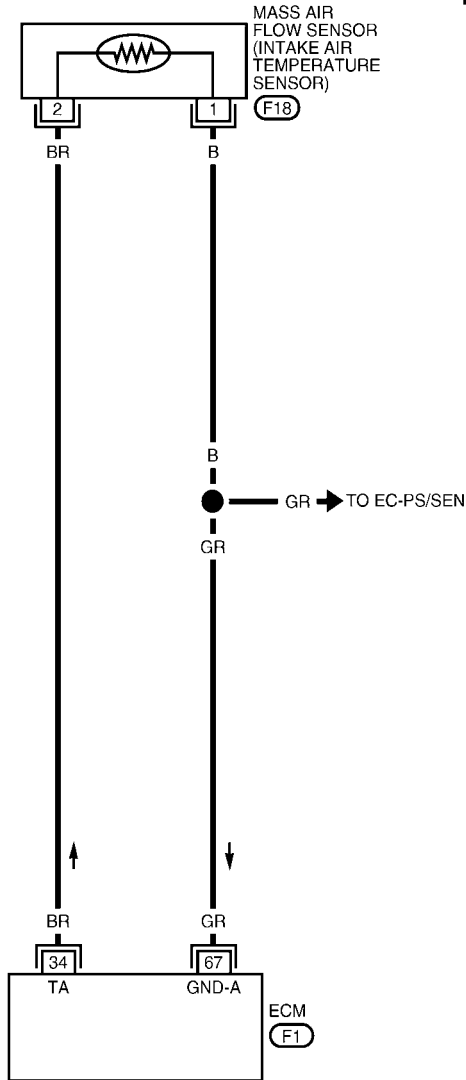
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448970

EC-IATSEN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



MBWA1355E

Diagnosis Procedure

INFOID:000000005448971

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.

IAT SENSOR

[VQ TYPE 2]

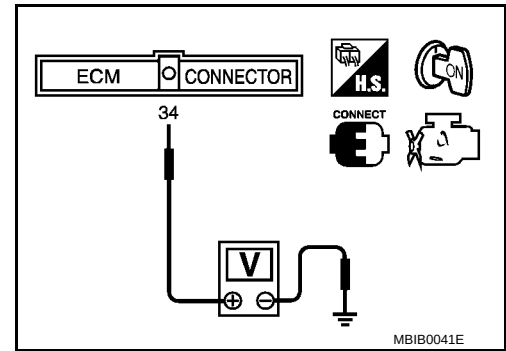
< SERVICE INFORMATION >

- Check voltage between ECM terminal 34 and ground with CONSULT or tester.

Voltage: Approximately 0 - 4.8V

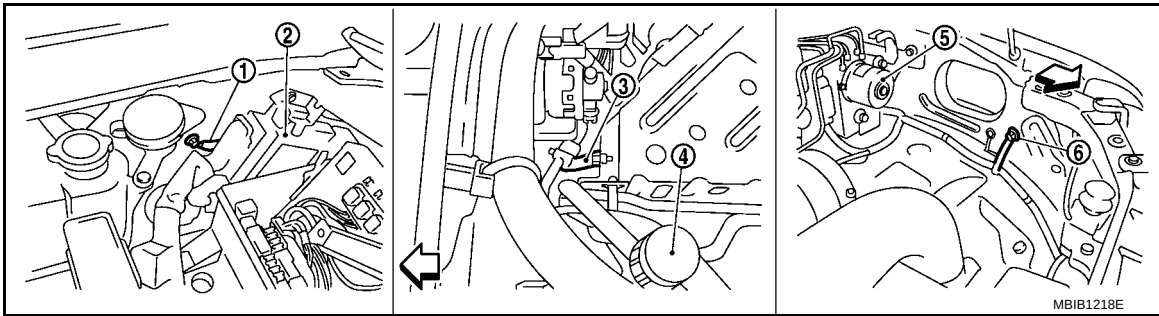
OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.



2.CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.
 Refer to [EC-627, "Ground Inspection"](#).



↩ : Vehicle front

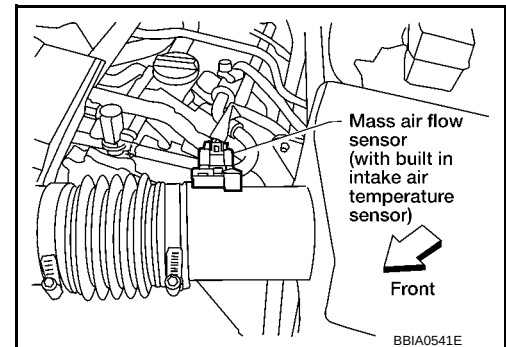
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 3.
 NG >> Repair or replace ground connections.

3.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
- Turn ignition switch ON.



IAT SENSOR

[VQ TYPE 2]

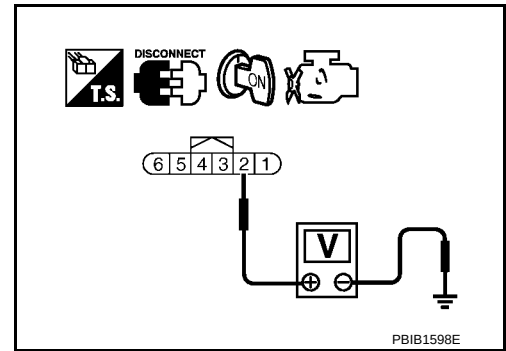
< SERVICE INFORMATION >

4. Check voltage between mass air flow sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 1 and ECM terminal 67.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-880, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

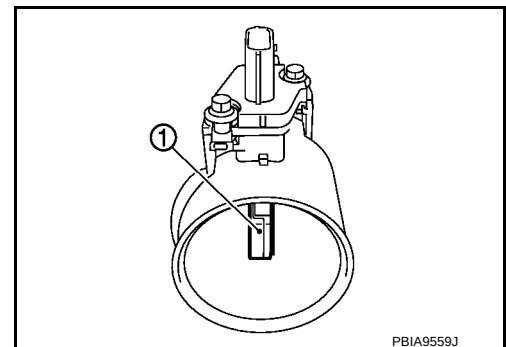
INFOID:000000005448972

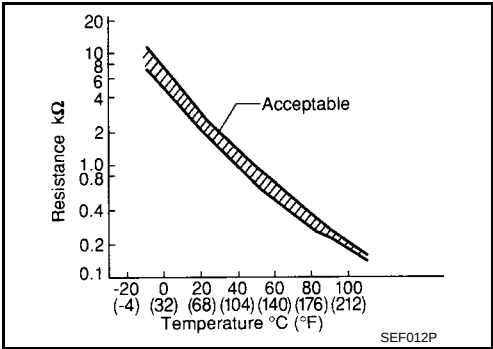
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

INFOID:000000005448973

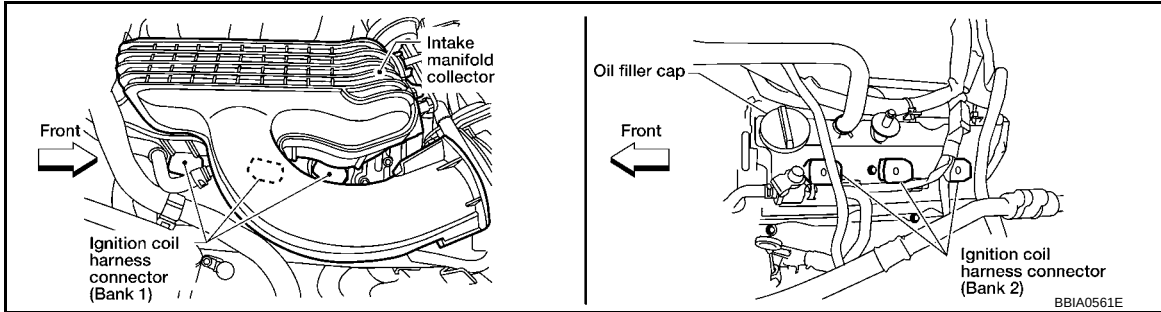
IGNITION SIGNAL

Component Description

INFOID:000000005448974

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



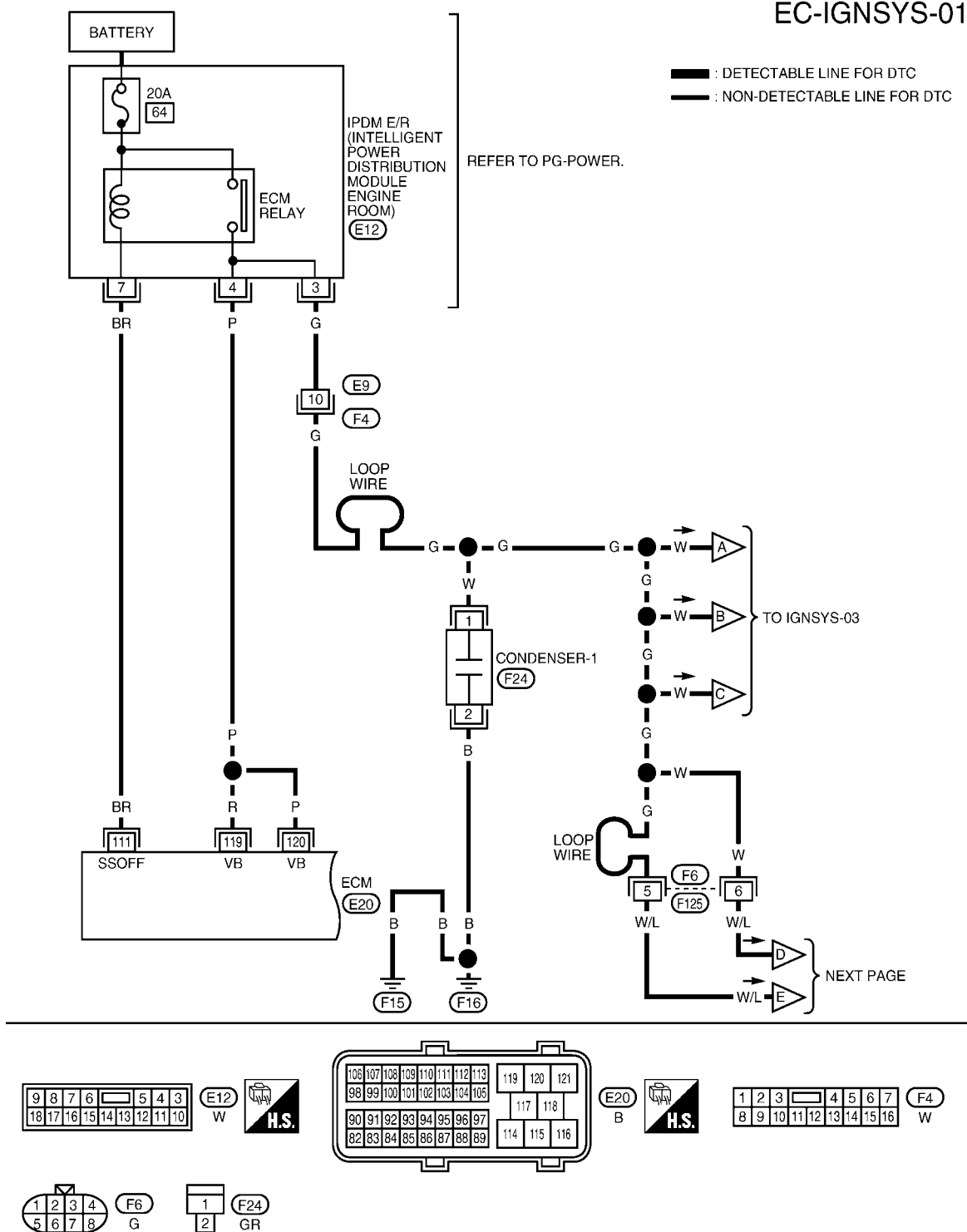
IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448975



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

JMBWA0448GB

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

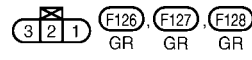
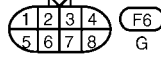
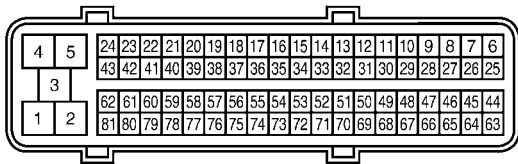
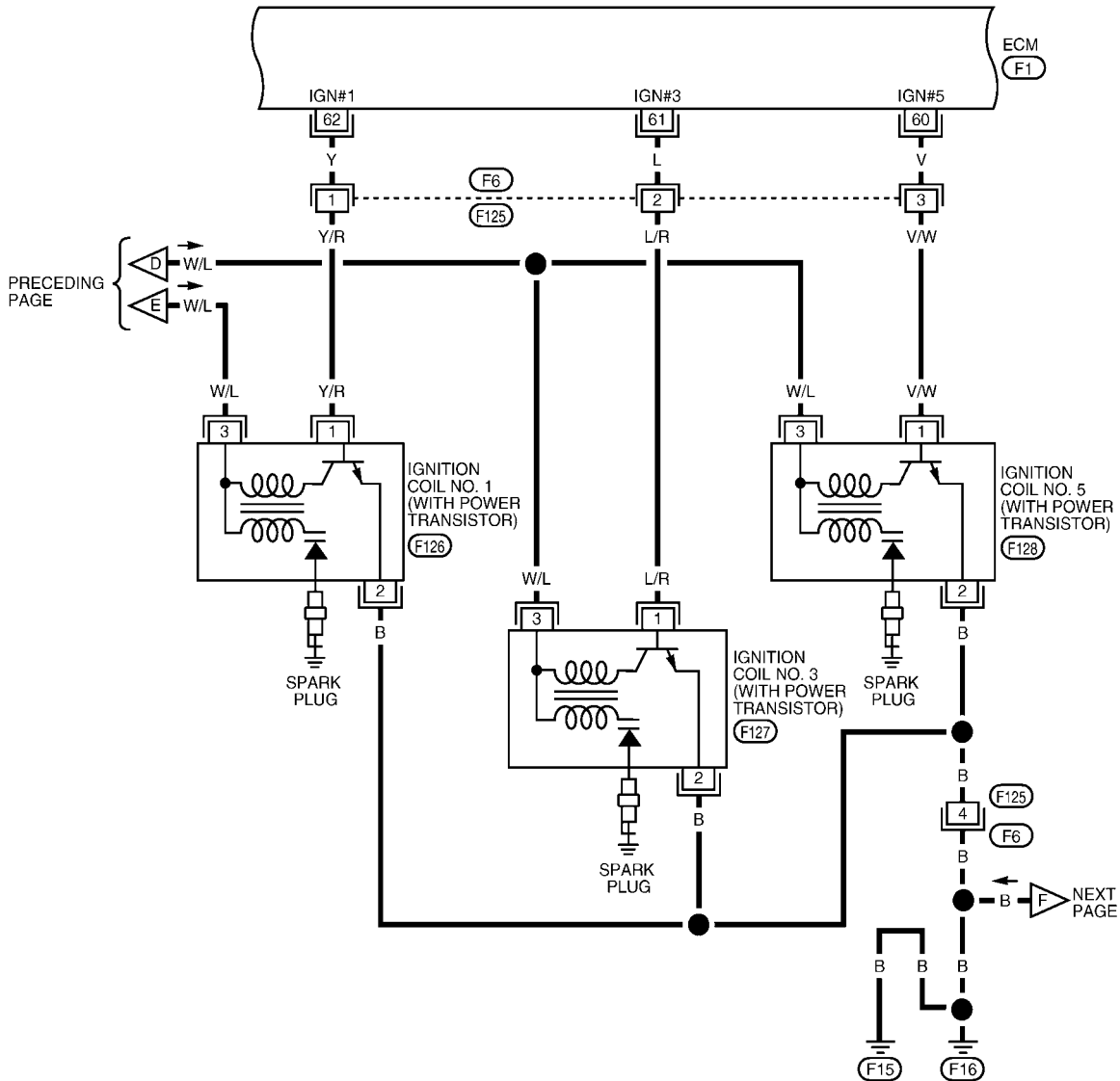
IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-IGNSYS-02

— : DETECTABLE LINE FOR DTC
 - - - : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

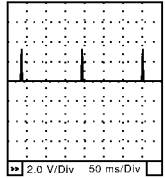
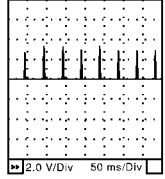
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

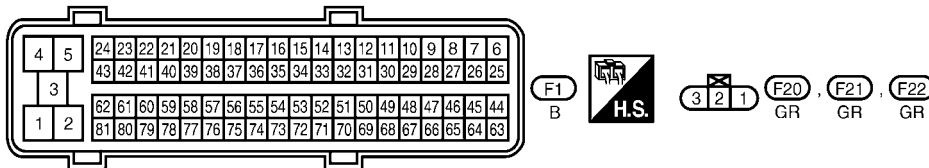
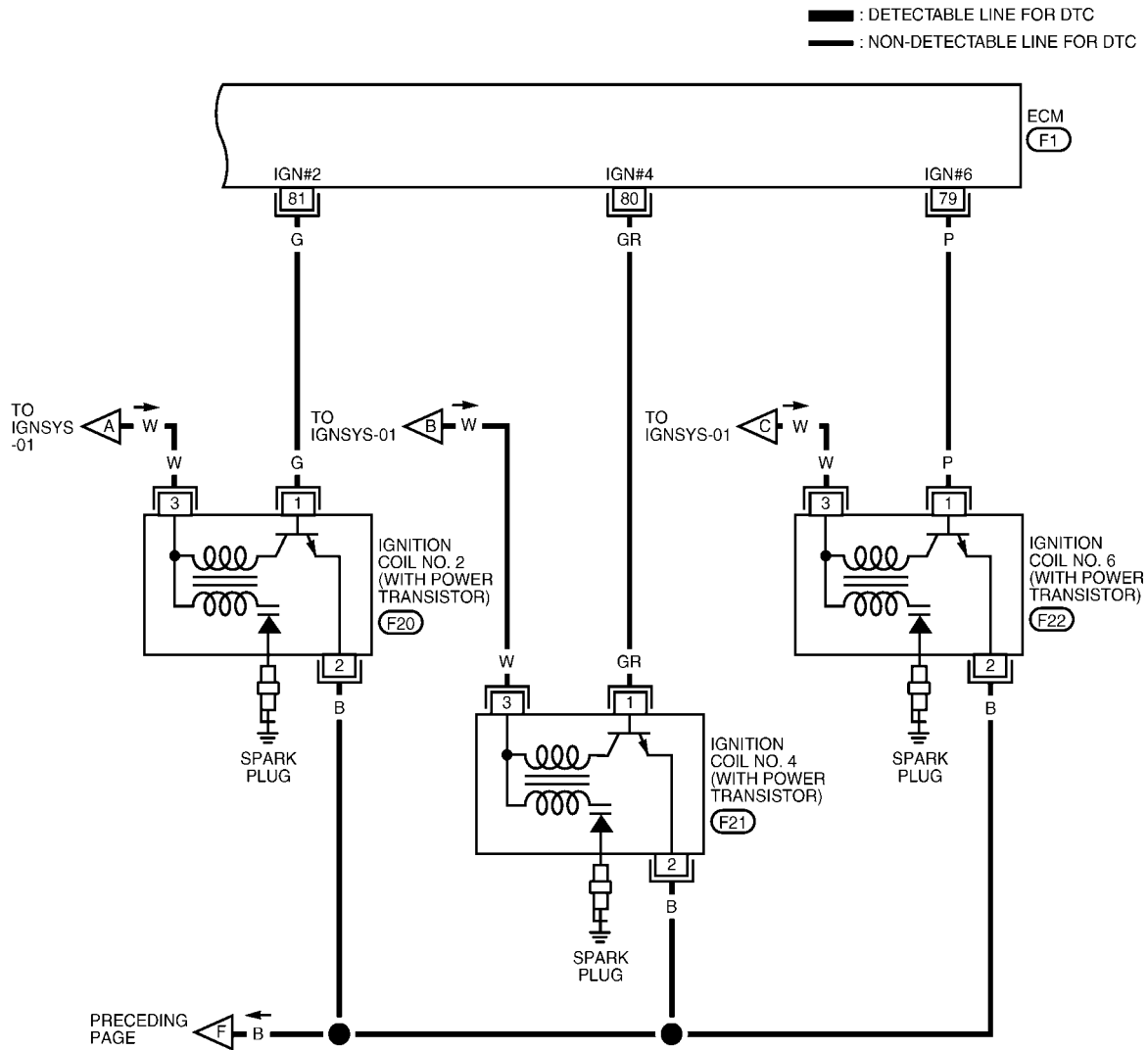
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-IGNSYS-03



Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT.

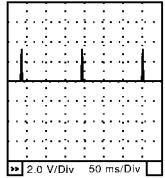
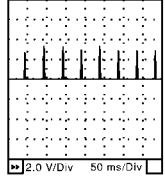
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000005448976

1.CHECK ENGINE START

Turn ignition switch OFF, and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT)>>GO TO 2.

Yes (Without CONSULT)>>GO TO 3.

No >> GO TO 4.

2.CHECK OVERALL FUNCTION

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3.CHECK OVERALL FUNCTION

Without CONSULT

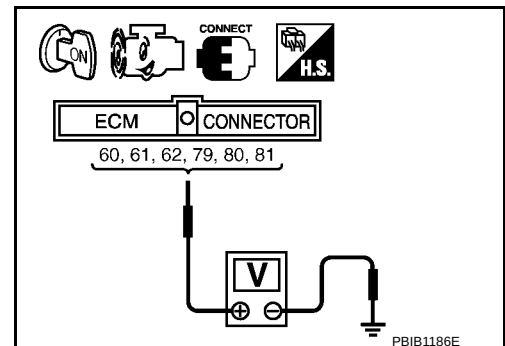
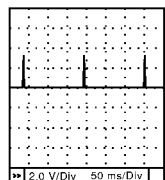
1. Let engine idle.

2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with an oscilloscope.

3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:

The pulse cycle changes depending on rpm at idle.



OK or NG

IGNITION SIGNAL

[VQ TYPE 2]

< SERVICE INFORMATION >

- OK >> **INSPECTION END**
NG >> GO TO 10.

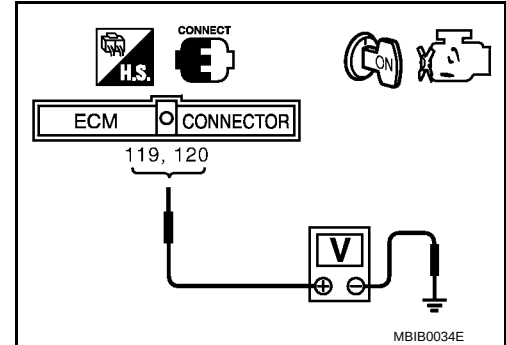
4.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT or tester.

Voltage: Battery voltage

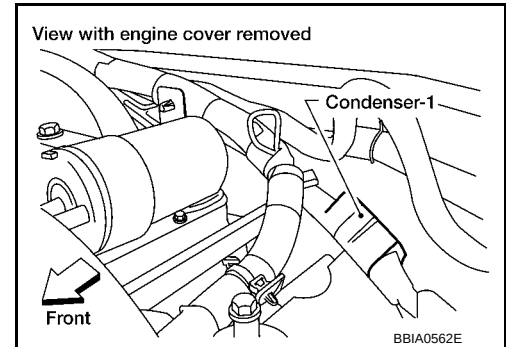
OK or NG

- OK >> GO TO 5.
NG >> Go to [EC-621](#).



5.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Turn ignition switch ON.

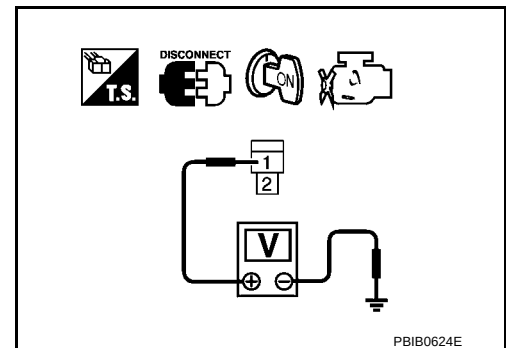


4. Check voltage between condenser-1 terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 17.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4

IGNITION SIGNAL

< SERVICE INFORMATION >

[VQ TYPE 2]

- Harness for open or short between condenser-1 and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

9.CHECK CONDENSER-1

Refer to [EC-891. "Component Inspection"](#).

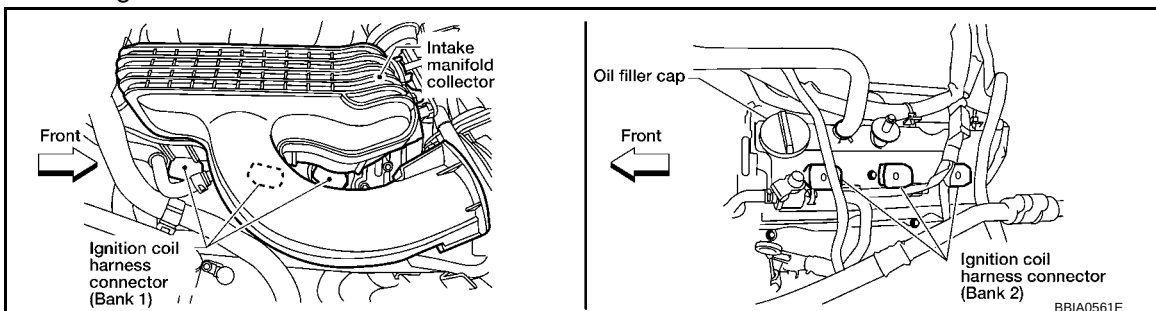
OK or NG

OK >> GO TO 10.

NG >> Replace condenser-1.

10.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.



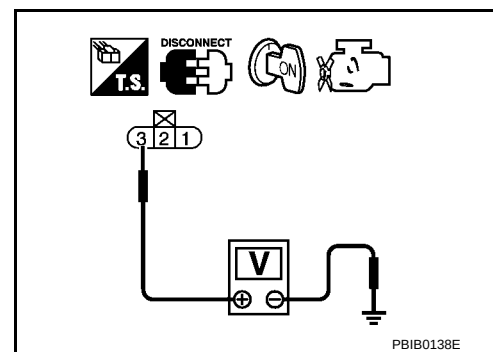
4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.



11.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and harness connector F4

>> Repair or replace harness or connectors.

12.CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.

< SERVICE INFORMATION >

Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 14.

NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6
- Harness for open or short between ignition coil and ground

>> Repair open circuit or short to power in harness or connectors.

14.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 and ignition coil terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

15.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-891. "Component Inspection"](#).

OK or NG

OK >> GO TO 17.

NG >> Replace ignition coil with power transistor.

17.CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000005448977

IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.

IGNITION SIGNAL

[VQ TYPE 2]

< SERVICE INFORMATION >

3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

4. If NG, Replace ignition coil with power transistor.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

NOTE:

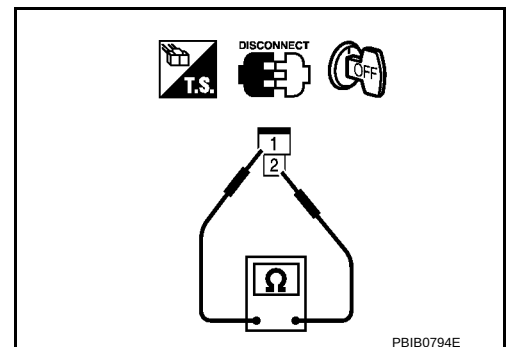
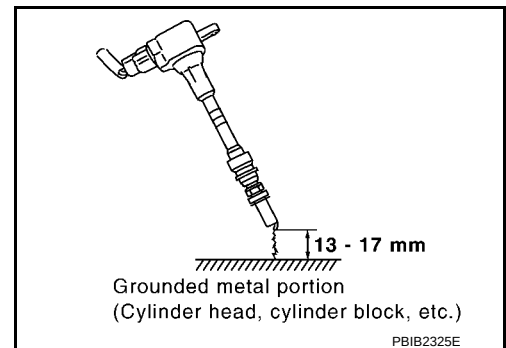
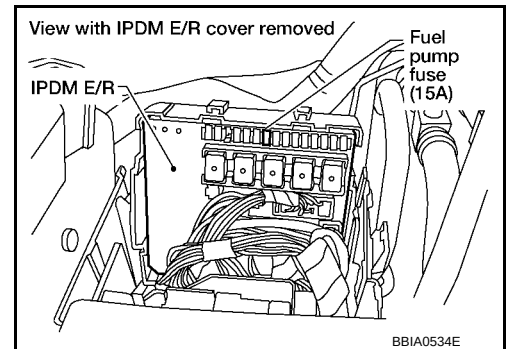
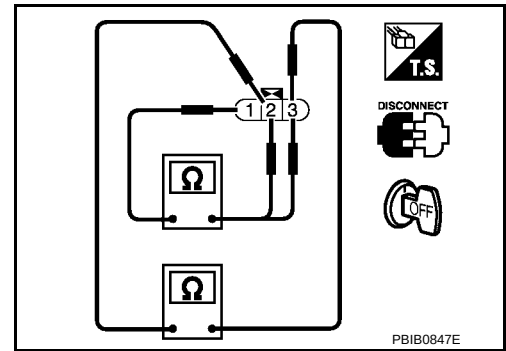
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

17. If NG, Replace ignition coil with power transistor.

CONDENSER-1

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Check resistance between condenser-1 terminals 1 and 2.

Resistance	Above 1 M Ω at 25°C (77°F)



Removal and Installation

INFOID:000000005448978

IGNITION COIL WITH POWER TRANSISTOR
Refer to [EM-33](#).

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REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

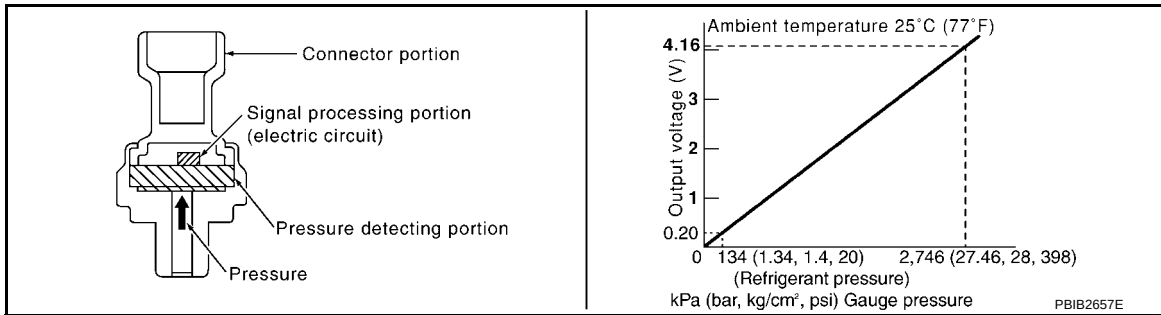
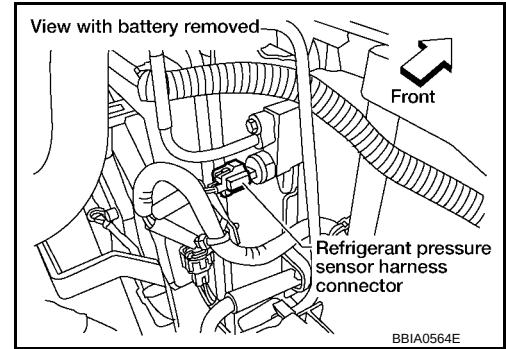
[VQ TYPE 2]

REFRIGERANT PRESSURE SENSOR

Component Description

INFOID:000000005448979

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

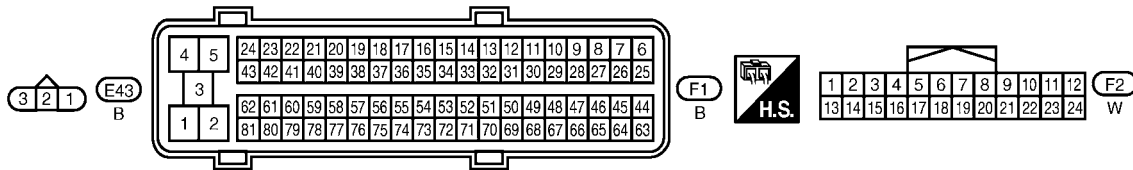
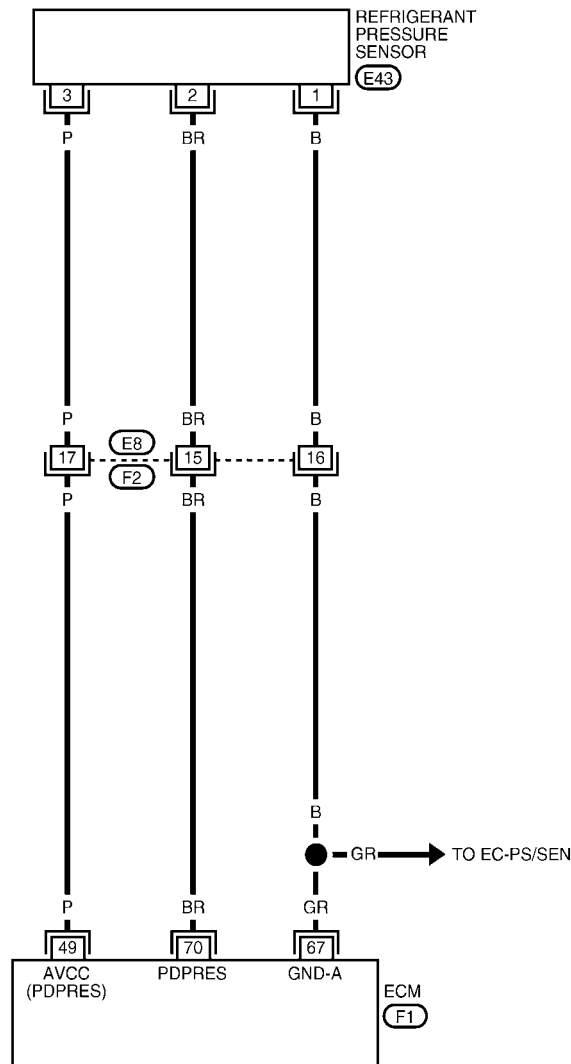
[VQ TYPE 2]

Wiring Diagram

INFOID:000000005448980

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

REFRIGERANT PRESSURE SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
67	GR	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
70	BR	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V

Diagnosis Procedure

INFOID:000000005448981

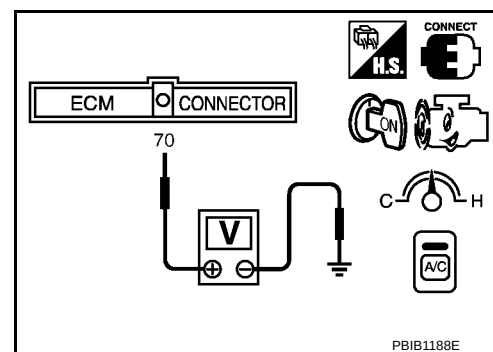
1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT or tester.

Voltage: 1.0 - 4.0V

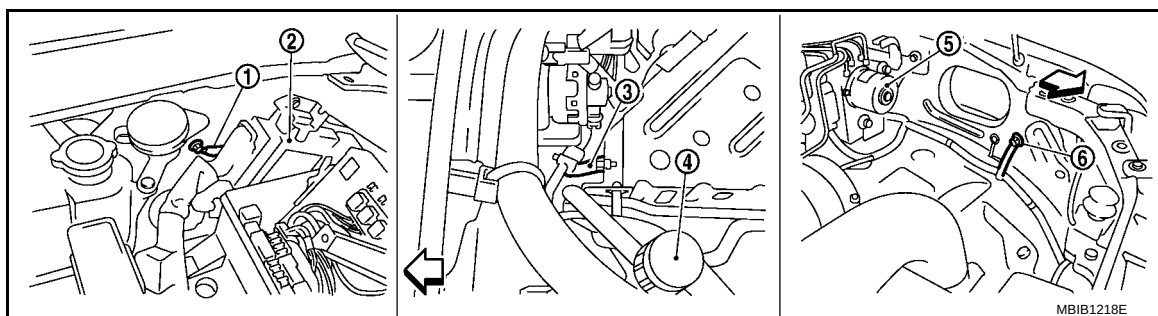
OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



2.CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to [EC-627. "Ground Inspection"](#).



↩ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace ground connections.

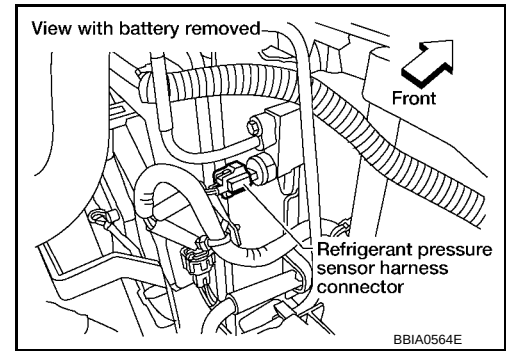
3.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

REFRIGERANT PRESSURE SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.

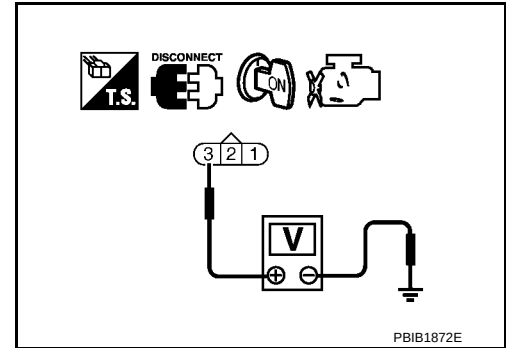


3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.



4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

5.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 7.
NG >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

REFRIGERANT PRESSURE SENSOR

[VQ TYPE 2]

< SERVICE INFORMATION >

- OK >> GO TO 9.
- NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

OK or NG

- OK >> Replace refrigerant pressure sensor.
- NG >> Repair or replace.

Removal and Installation

INFOID:000000005448982

REFRIGERANT PRESSURE SENSOR

Refer to [ATC-247, "Removal and Installation for Refrigerant Pressure Sensor"](#).

VIAS

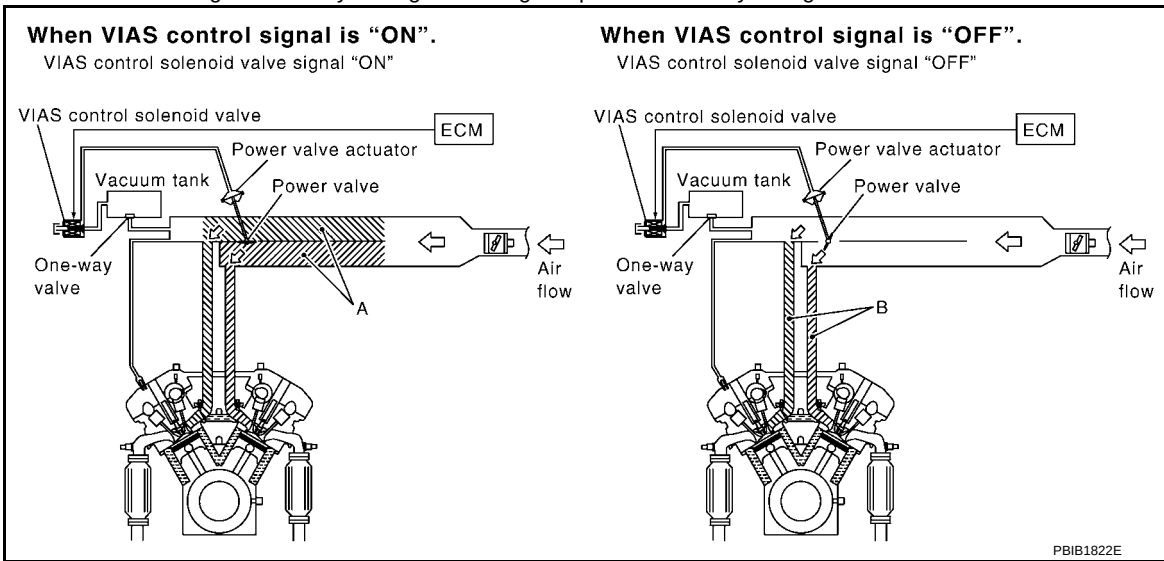
Description

INFOID:000000005448983

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.

Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.

When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.

Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

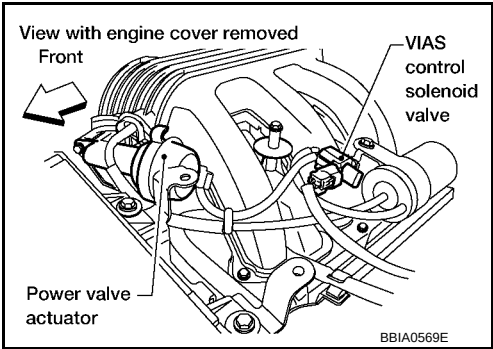
Power Valve

VIAS

< SERVICE INFORMATION >

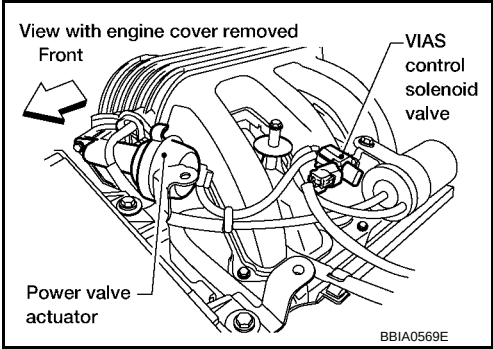
[VQ TYPE 2]

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT Reference Value in Data Monitor Mode

INFOID:000000005448984

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	• Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF

Wiring Diagram

INFOID:0000000005448985

EC-VIAS-01

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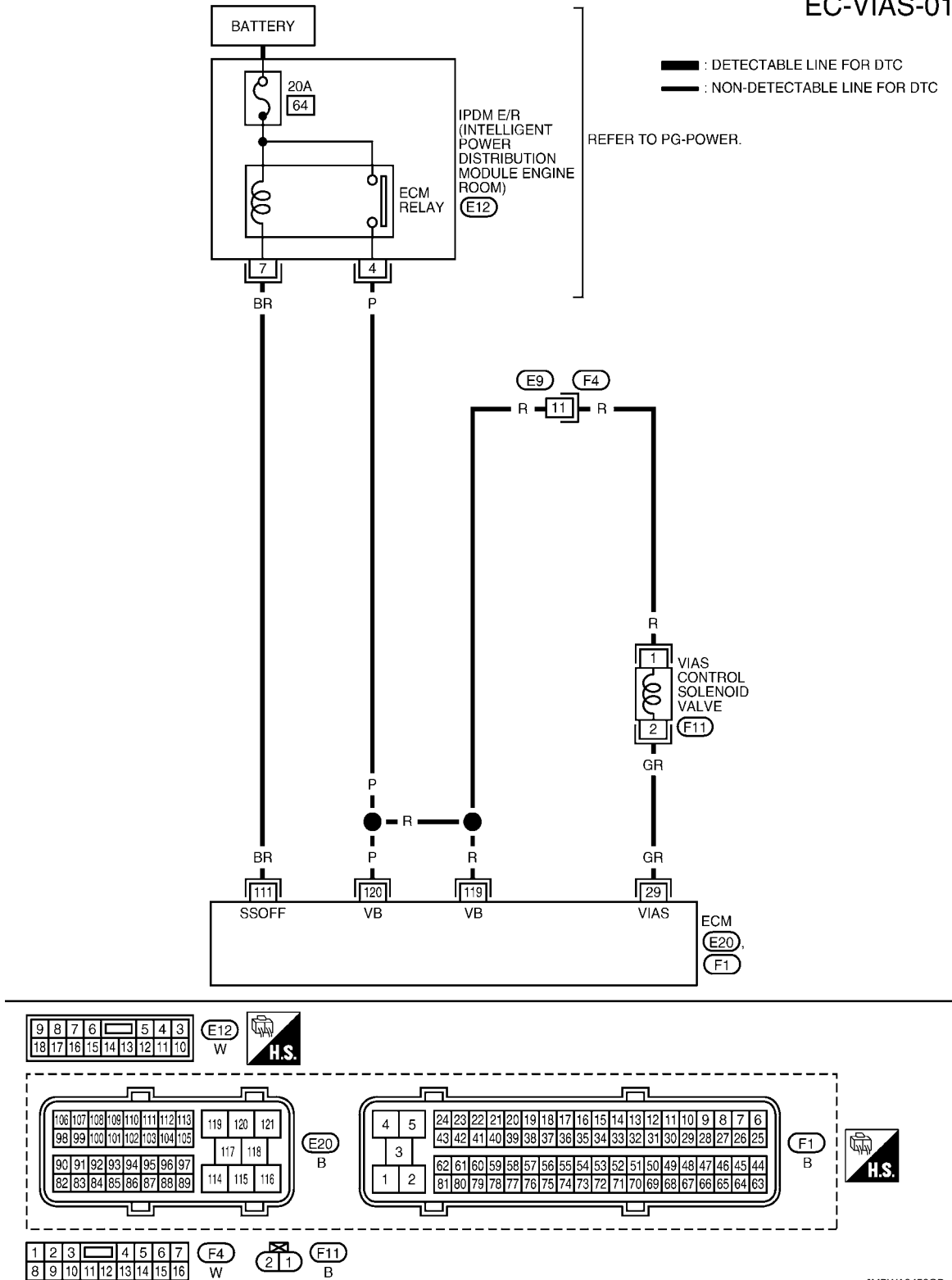
L

M

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Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	GR	VIAS control solenoid valve	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
111	BR	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

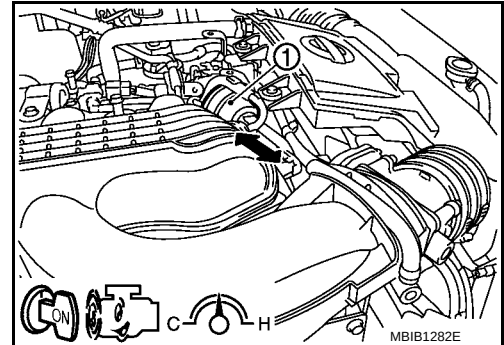
Diagnosis Procedure

INFOID:000000005448986

1.CHECK OVERALL FUNCTION

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT.
3. Turn VIAS control solenoid valve "ON" and "OFF", and make sure that power valve actuator (1) rod moves.



Without CONSULT

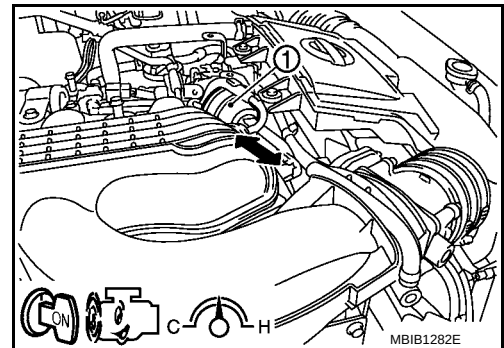
1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to between 2,200 and 3,300 rpm and make sure that power valve actuator (1) rod moves.

OK or NG

OK >> **INSPECTION END**

NG (With CONSULT) >>GO TO 2.

NG (Without CONSULT) >>GO TO 3.



2.CHECK VACUUM EXISTENCE

With CONSULT

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT.

VIAS

[VQ TYPE 2]

< SERVICE INFORMATION >

- Turn VIAS control solenoid valve "ON" and "OFF", and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

OK or NG

- OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3.CHECK VACUUM EXISTENCE

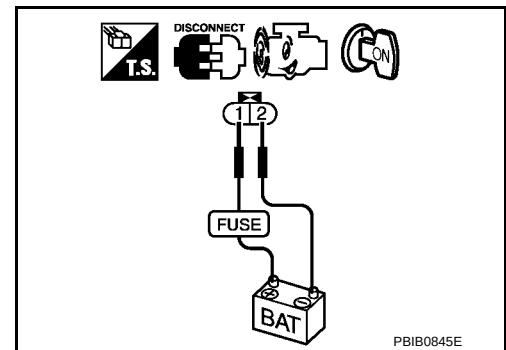
⊗ Without CONSULT

- Stop engine and disconnect vacuum hose connected to power valve actuator.
- Disconnect VIAS control solenoid valve harness connector.
- Start engine and let it idle.
- Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
- Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

OK or NG

- OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

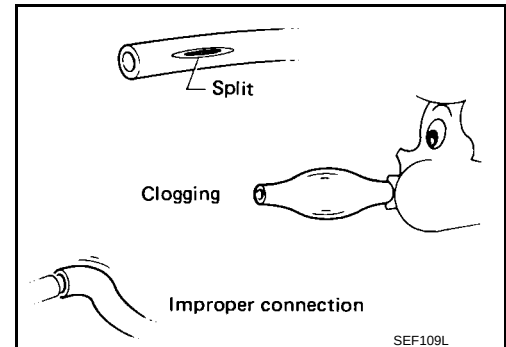


4.CHECK VACUUM HOSE

- Stop engine.
- Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to [EC-588, "Vacuum Hose Drawing"](#).

OK or NG

- OK >> GO TO 5.
NG >> Repair hoses or tubes.



5.CHECK VACUUM TANK

Refer to [EC-905, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace vacuum tank.

6.CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

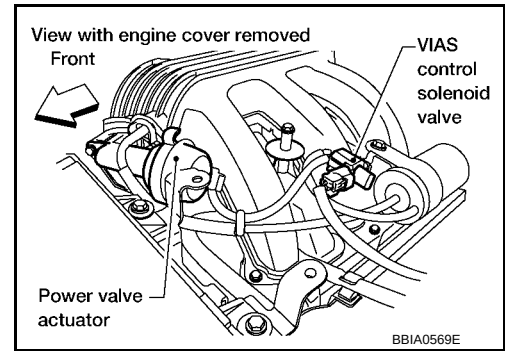
- Turn ignition switch OFF.

VIAS

[VQ TYPE 2]

< SERVICE INFORMATION >

2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.

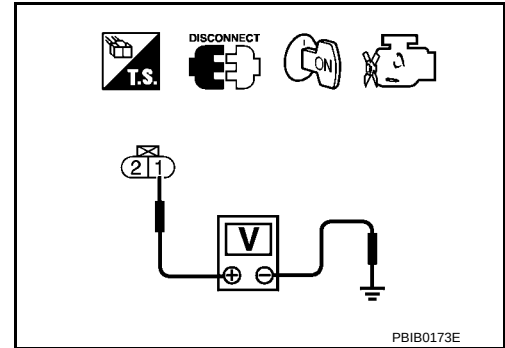


4. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
- Harness for open or short between VIAS control solenoid valve and ECM

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to [EC-905, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-620](#).

>> INSPECTION END

Component Inspection

INFOID:000000005448987

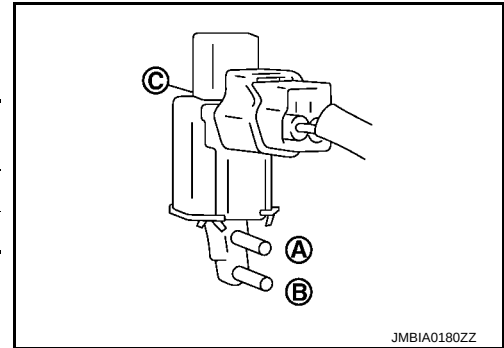
VIAS CONTROL SOLENOID VALVE

 With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

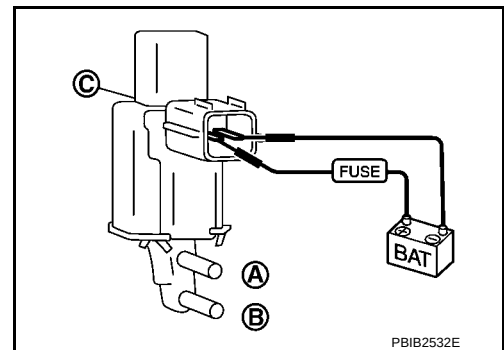


 Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

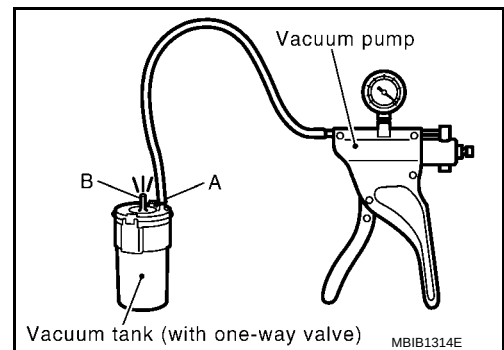
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



Removal and Installation

INFOID:000000005448988

VIAS CONTROL SOLENOID VALVE

Refer to [EM-21](#).

VSS

Description

INFOID:000000005448989

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

Diagnosis Procedure

INFOID:000000005448990

1. INSPECTION START

Do you have CONSULT?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT.
5. Select “VHCL SPEED SE” indication when rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 3.

3. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to [BRC-10, "Fail-Safe Function"](#).

OK or NG

OK >> GO TO 4.

NG >> Repair or replace.

4. CHECK COMBINATION METER FUNCTION

Refer to [DI-4](#).

>> INSPECTION END

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

[VQ TYPE 2]

MIL AND DATA LINK CONNECTOR

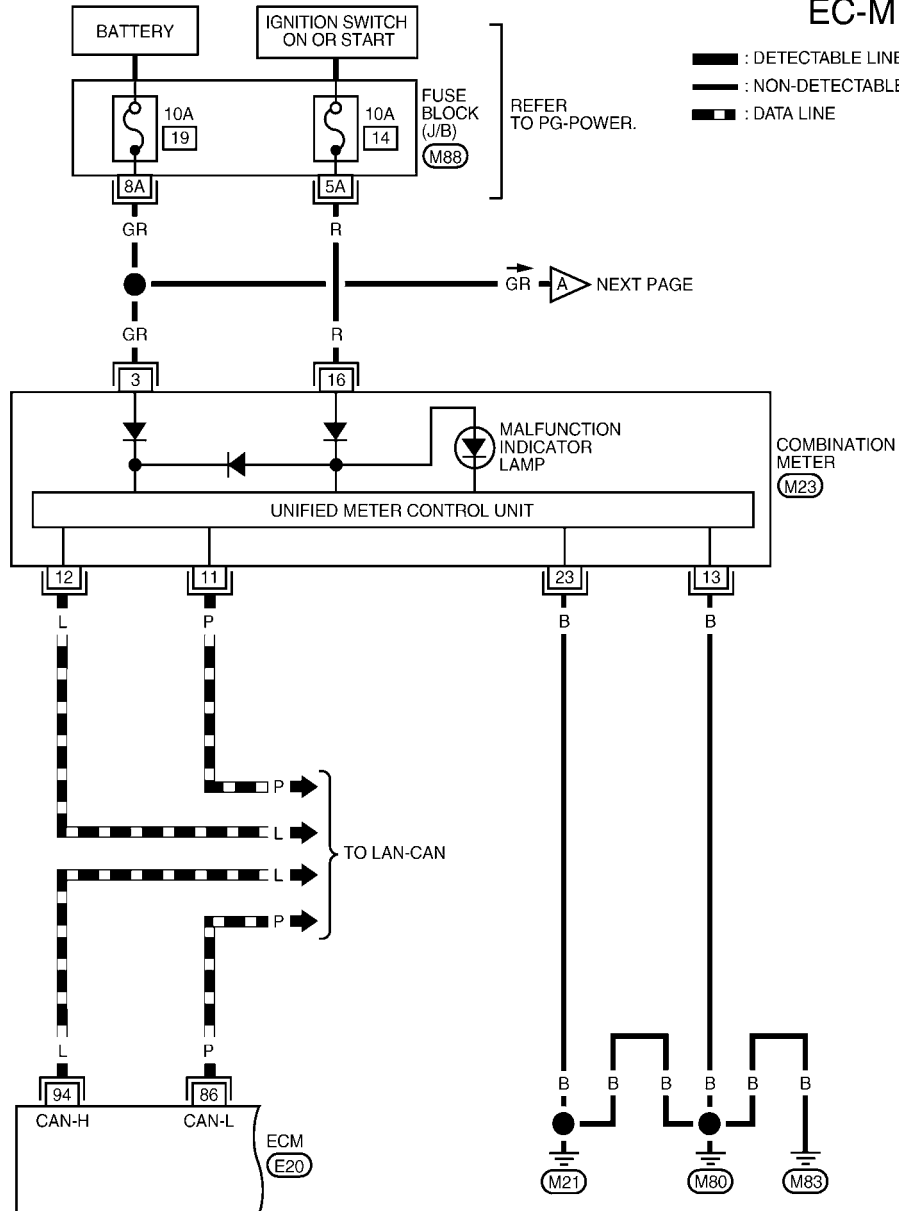
Wiring Diagram

INFOID:000000005448991

EC-MIL/DL-01

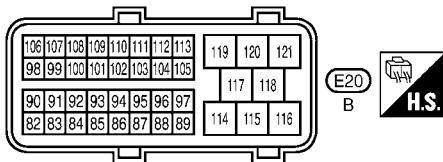
- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- : DATA LINE

REFER TO PG-POWER.



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

(M23) W



REFER TO THE FOLLOWING.
(M88) - FUSE BLOCK -
JUNCTION BOX (J/B)

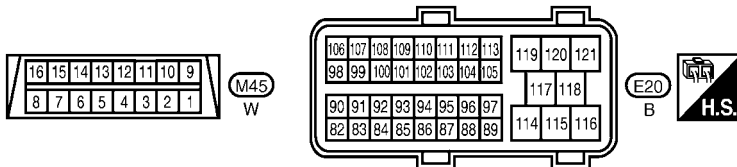
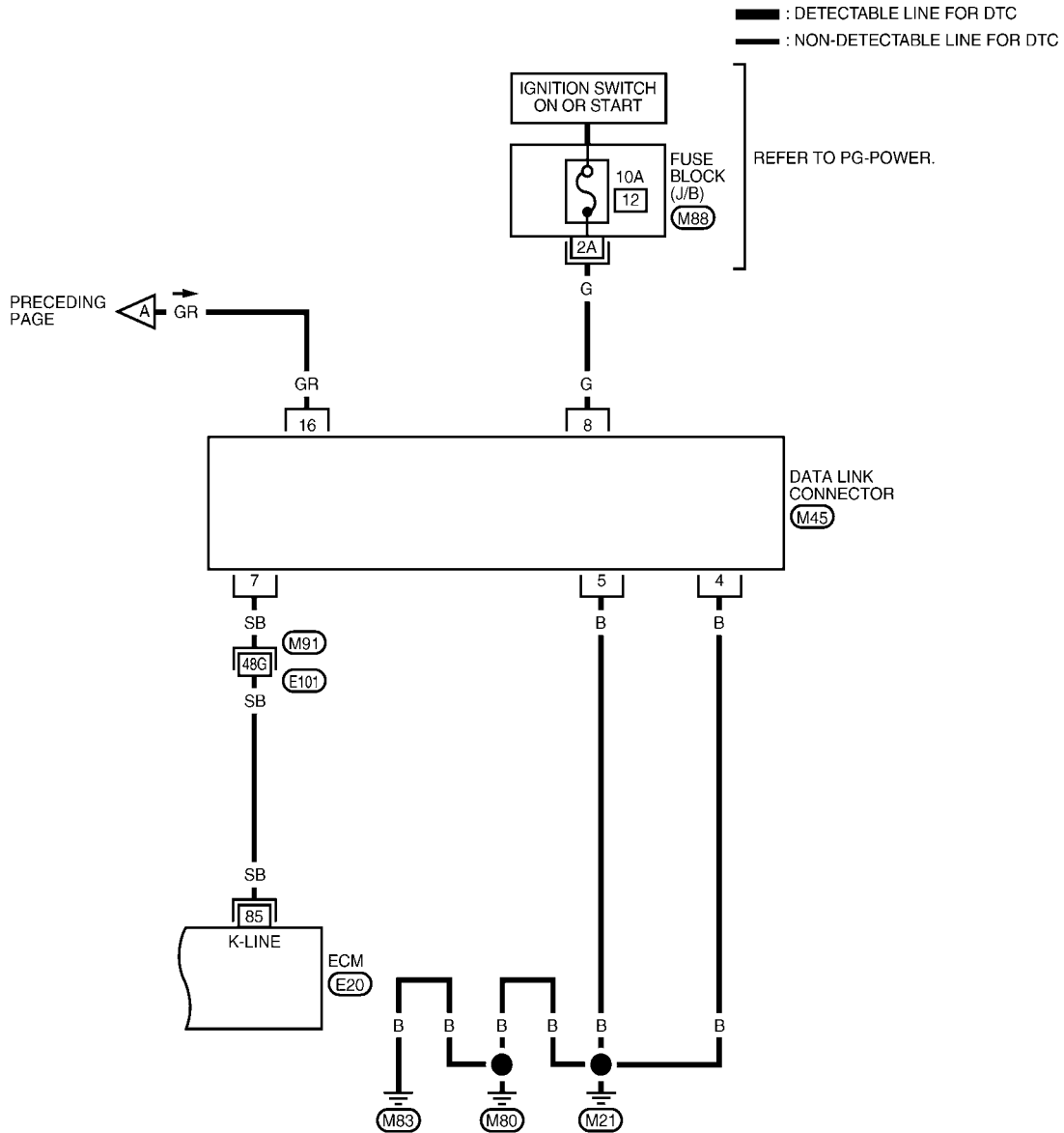
JMBWA0451GB

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

[VQ TYPE 2]

EC-MIL/DL-02



MBWA1327E

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VQ TYPE 2]

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:000000005448992

Fuel pressure at idling kPa (bar, kg/cm ² , psi)	Approximately 350 (3.5, 3.57, 51)

Idle Speed and Ignition Timing

INFOID:000000005448993

Target idle speed	No load* [in P or N position (A/T), Neutral position (M/T)]	625 ± 50 rpm
Air conditioner: ON	In P or N position (A/T), Neutral position (M/T)	775 rpm or more
Ignition timing	In P or N position (A/T), Neutral position (M/T)	15 ± 5° BTDC

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

INFOID:000000005448994

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.2V*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

INFOID:000000005448995

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:000000005448996

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:000000005448997

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen sensor 2 Heater

INFOID:000000005448998

Resistance [at 25°C (77°F)]	9.9 - 13.3Ω

Crankshaft Position Sensor (POS)

INFOID:000000005448999

Refer to [EC-672, "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

INFOID:000000005449000

Refer to [EC-680, "Component Inspection"](#).

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VQ TYPE 2]

Throttle Control Motor

INFOID:0000000005449001

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

INFOID:0000000005449002

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω

Fuel Pump

INFOID:0000000005449003

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006106674

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

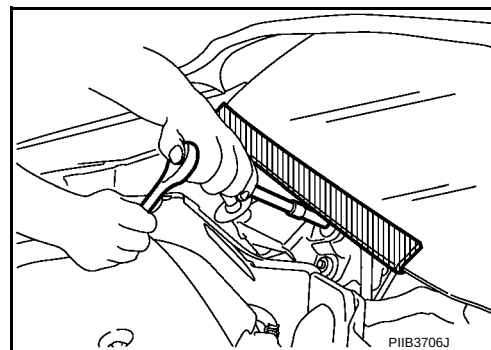
WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000006106675

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



On Board Diagnosis (OBD) System of Engine and A/T

INFOID:000000006106676

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-82, "Description"](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.

PRECAUTIONS

[YD25DDTi]

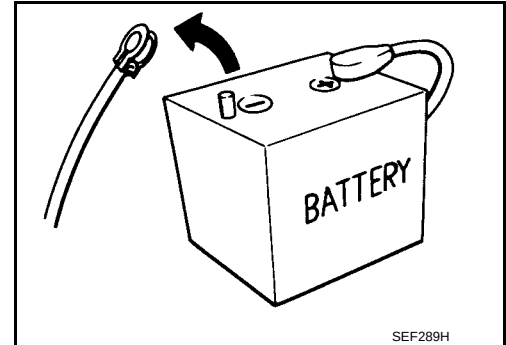
< PRECAUTION >

- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM before returning the vehicle to the customer.

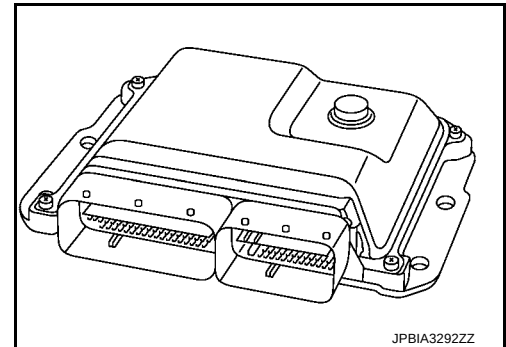
Precaution

INFOID:000000006106677

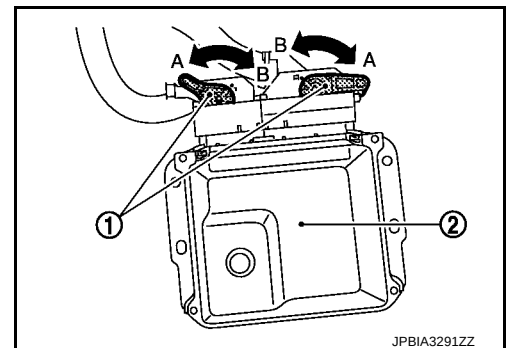
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.



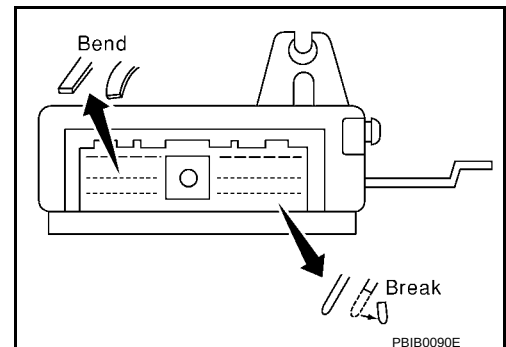
- Do not disassemble ECM.



- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.
- Levers (1)
- ECM (2)
- Fasten (A)
- Loosen (B)



- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.
- Keep engine control system parts and harness dry.

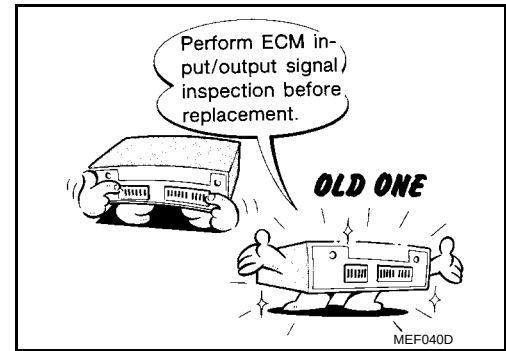


PRECAUTIONS

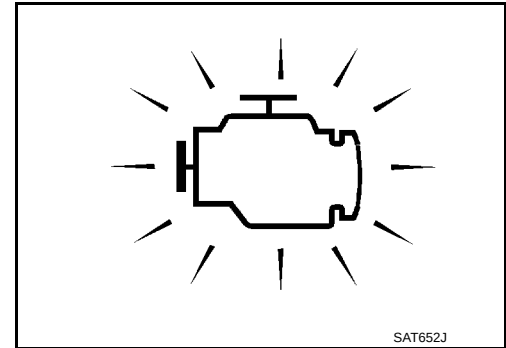
[YD25DDTi]

< PRECAUTION >

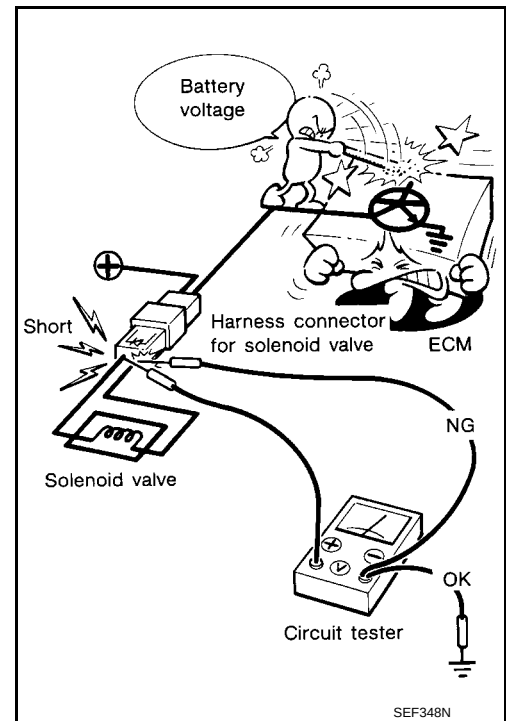
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to [EC-954, "Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor, crankshaft position sensor.



- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC CONFIRMATION PROCEDURE if the repair is completed. The Component Function Check should be a good result if the repair is completed.



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not disassemble fuel pump. If NG, take proper action.
- Do not disassemble fuel injector. If NG, replace fuel injector.

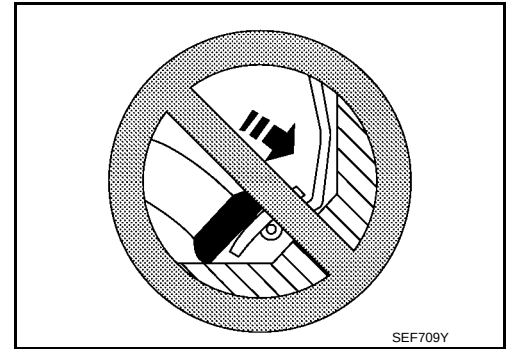


PRECAUTIONS

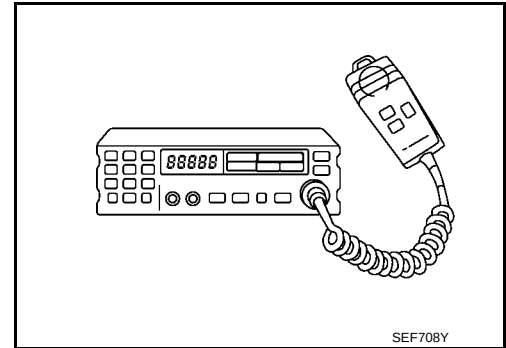
[YD25DDTi]

< PRECAUTION >

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

< PREPARATION >

[YD25DDTi]

PREPARATION

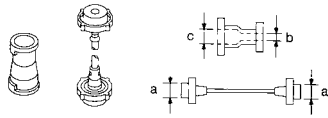
PREPARATION

Special Service Tool

INFOID:000000006106678

A

EC

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter	Adapting radiator cap tester to radiator cap and radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)
 S-NT564	

C

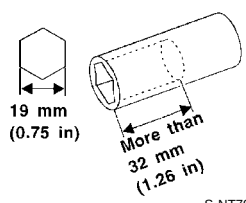
D

E

Commercial Service Tool

INFOID:000000006106679

F

Tool name	Description
Socket wrench	Removing and installing engine coolant temperature sensor
 S-NT705	

G

H

I

J

K

L

M

N

O

P

SYSTEM DESCRIPTION

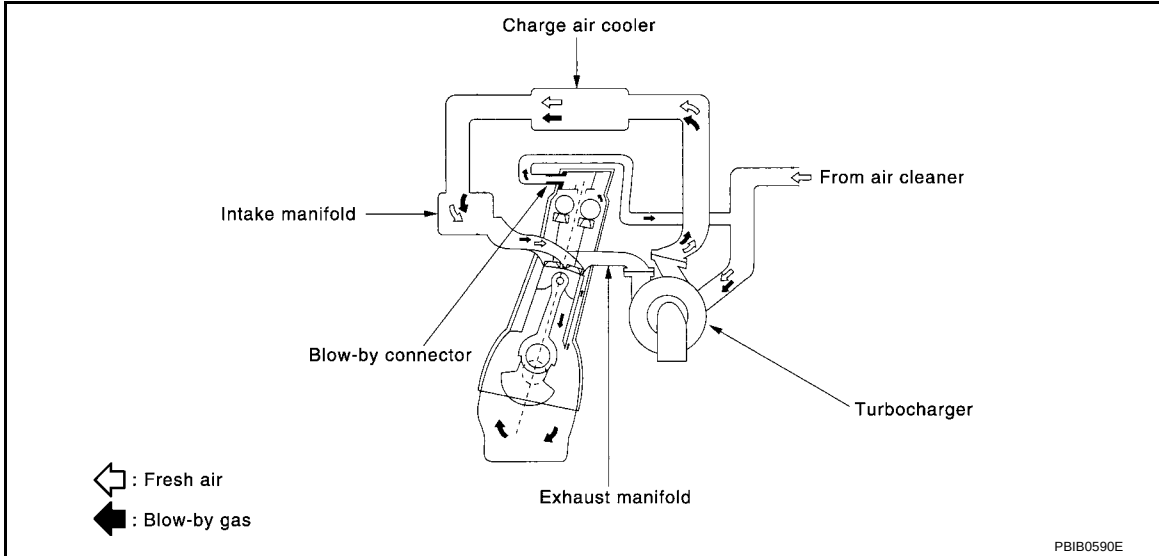
STRUCTURE AND OPERATION

Crankcase Ventilation System

INFOID:000000006106680

DESCRIPTION

In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

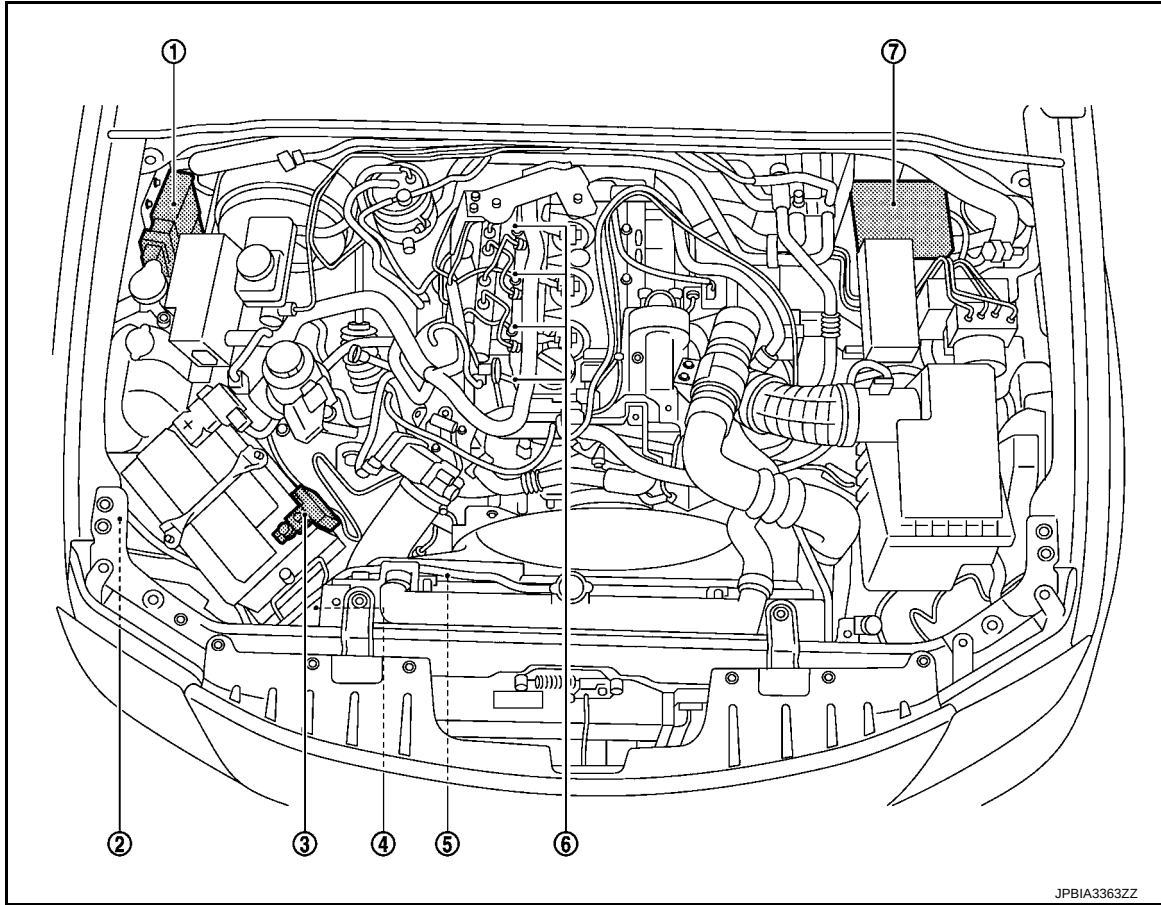
[YD25DDTi]

COMPONENT PARTS

Component Parts Location

INFOID:000000006106681

ENGINE ROOM COMPARTMENT



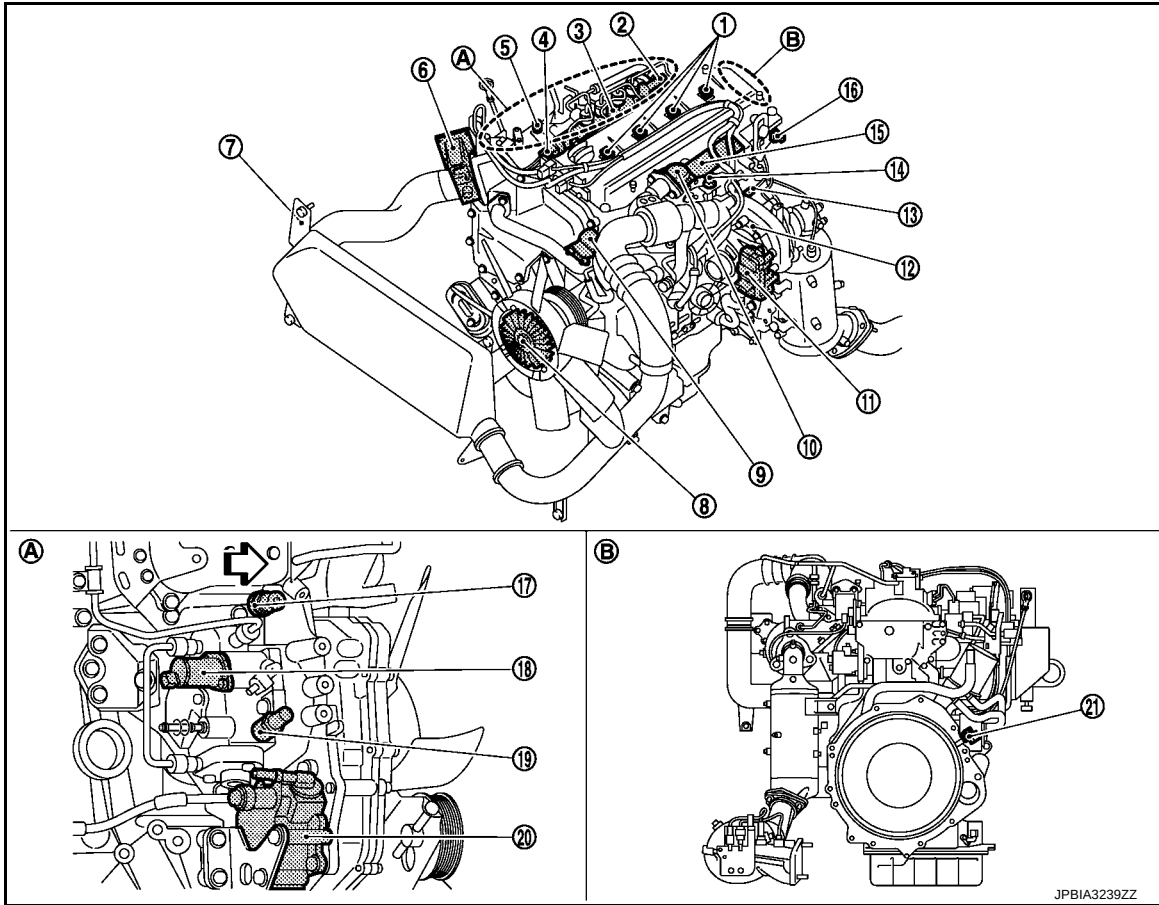
1. ECM	2. Glow control unit	3. Battery current sensor with battery temperature sensor
4. Refrigerant pressure sensor	5. Cooling fan motor	6. Glow plug
7. IPDM E/R		

ENGINE COMPARTMENT

COMPONENT PARTS

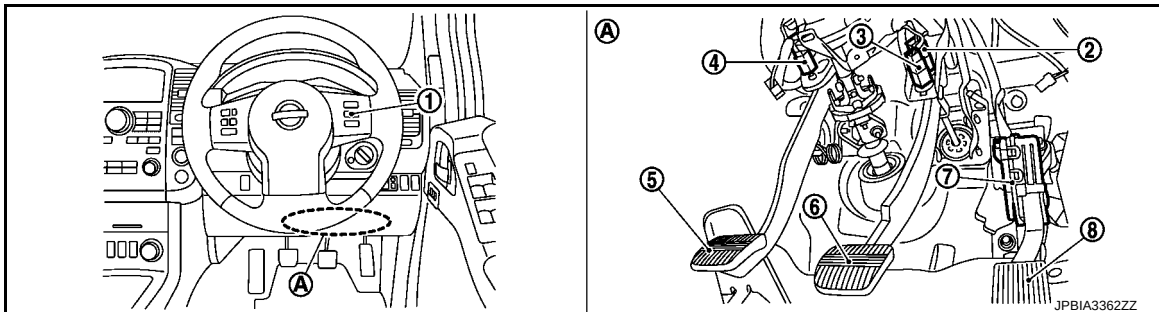
< SYSTEM DESCRIPTION >

[YD25DDTi]



1. Fuel injector	2. Fuel rail pressure relief valve	3. Fuel rail
4. Fuel rail pressure sensor	5. Intake air temperature sensor 2	6. Electric throttle control actuator
7. Turbocharger boost sensor	8. Cooling fan	9. EGR volume control valve
10. EGR cooler bypass valve	11. Turbocharger boost control actuator	12. Turbocharger
13. Exhaust gas temperature sensor 1	14. Exhaust gas pressure sensor 1	15. EGR cooler
16. Camshaft position sensor	17. Engine coolant temperature sensor	18. Fuel pump
19. Fuel pump temperature sensor	20. Vacuum pump	21. Crankshaft position sensor
- A. Engine room (right side) B. Rear view of the engine
- ↖ :Vehicle front

BODY COMPARTMENT



1. ASCD steering switch	2. ASCD brake switch	3. Stop lamp switch
4. Clutch pedal position switch (M/T models)	5. Clutch pedal (M/T models)	6. Brake pedal

COMPONENT PARTS

[YD25DDTi]

< SYSTEM DESCRIPTION >

- 7. Accelerator pedal position sensor
- 8. Accelerator pedal
- A. Dash side lower (driver side)

Component Description

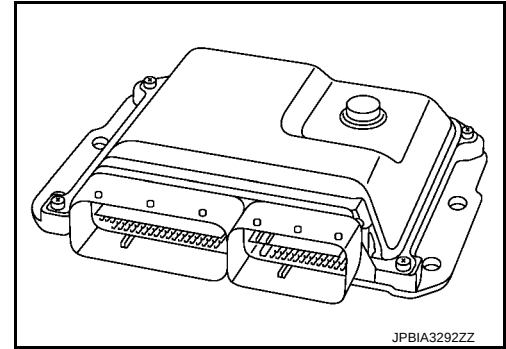
INFOID:000000006106682

Component	Reference
ECM	EC-920, "ECM"
Barometric pressure sensor	EC-920, "Barometric Pressure Sensor"
Fuel pump	EC-920, "Fuel Pump"
Fuel pump temperature sensor	EC-920, "Fuel Pump Temperature Sensor"
Fuel rail pressure sensor	EC-920, "Fuel Rail Pressure Sensor"
Fuel injector	EC-920, "Fuel Injector"
Glow control unit	EC-920, "Glow Control Unit"
Glow plug	EC-921, "Glow Plug"
Accelerator pedal position sensor	EC-921, "Accelerator Pedal Position Sensor"
Crankshaft position sensor	EC-921, "Crankshaft Position Sensor"
Camshaft position sensor	EC-921, "Camshaft Position Sensor"
Electric throttle control actuator	EC-922, "Electric Throttle Control Actuator"
Engine coolant temperature sensor	EC-922, "Engine Coolant Temperature Sensor"
Mass air flow sensor	EC-922, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
Intake air temperature sensor 1	
Intake air temperature sensor 2	EC-923, "Intake Air Temperature Sensor 2"
Turbocharger boost sensor	EC-924, "TurboCharger Boost Sensor"
Turbocharger boost control actuator	EC-924, "Turbocharger Boost Control Actuator"
Exhaust gas temperature sensor 1	EC-924, "Exhaust Gas Temperature Sensor 1"
Exhaust gas pressure sensor 1	EC-925, "Exhaust Gas Pressure Sensor 1"
EGR volume control system	EC-925, "EGR Volume Control Valve"
EGR cooler bypass valve control solenoid valve	EC-925, "EGR Cooler Bypass Valve Control Solenoid Valve"
Battery current sensor	EC-926, "Battery Current Sensor (With Battery Temperature Sensor)"
Battery temperature sensor	
Cooling fan (motor driven type)	EC-926, "Cooling Fan (Motor Driven Type)"
Refrigerant pressure sensor	EC-926, "Refrigerant Pressure Sensor"
Heat up switch	EC-927, "Heat Up Switch"
Stop lamp switch	
ASCD brake switch	EC-927, "Stop Lamp Switch & ASCD Brake Switch"
ASCD steering switch	EC-927, "ASCD Steering Switch"
Information display	EC-927, "Information Display"

ECM

INFOID:000000006106683

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



Barometric Pressure Sensor

INFOID:000000006106684

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

Fuel Pump

INFOID:000000006106685

The fuel pump is installed in the engine. Utilizing the revolutions of the engine via gears, the fuel pump discharges high-pressure fuel to the fuel rail. The fuel pressure is controlled by the ECM.

Fuel Pump Temperature Sensor

INFOID:000000006106686

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

Fuel Rail Pressure Sensor

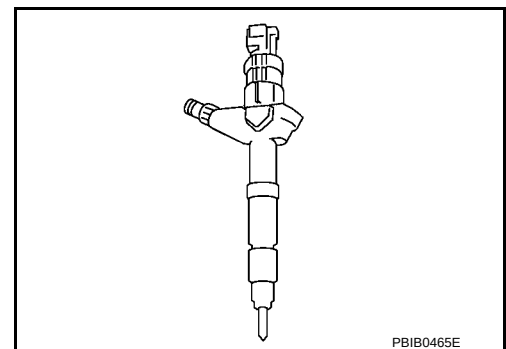
INFOID:000000006106687

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

Fuel Injector

INFOID:000000006106688

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Glow Control Unit

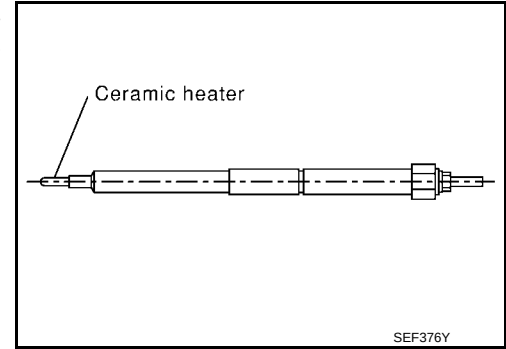
INFOID:000000006106689

Glow control unit is controlled by ECM via PWM signal communication and improves performance in engine start. Furthermore, this unit incorporates self-diagnosis function. When malfunction is detected, glow control unit transmits malfunction signal to ECM via PWM signal communication.

Glow Plug

INFOID:000000006106690

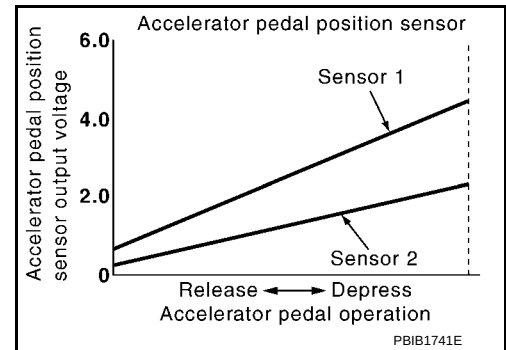
The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow control unit.



Accelerator Pedal Position Sensor

INFOID:000000006106691

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

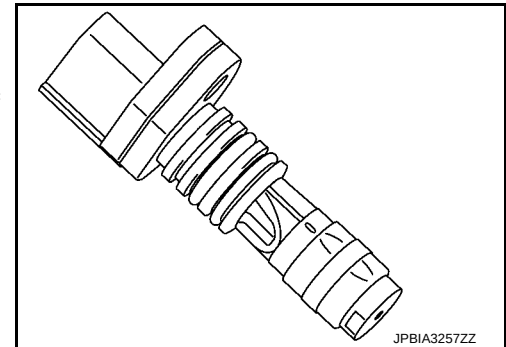


Crankshaft Position Sensor

INFOID:000000006106692

The crankshaft position (CKP) sensor is located on the cylinder block front facing the gear teeth of the signal plate installed to the crankshaft pulley.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



Camshaft Position Sensor

INFOID:000000006106693

The camshaft position (CMP) sensor senses the protrusion of the signal plate installed to the camshaft (left side) front end to identify a particular cylinder. The camshaft position sensor senses the piston position.

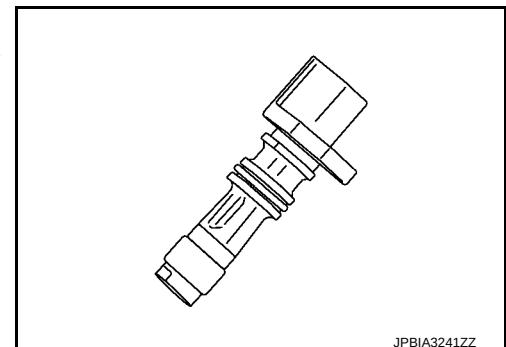
When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.



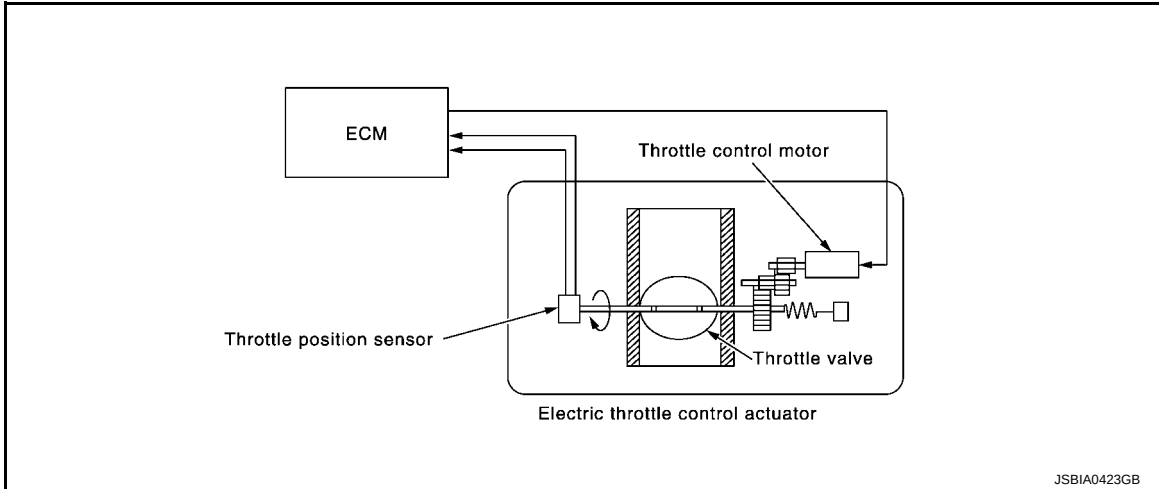
Electric Throttle Control Actuator

INFOID:000000006106694

Electric throttle control actuator consists of throttle control motor which operates throttle valve, throttle position sensor which detects the opening angle of throttle valve.

Throttle valve is fully opened when regeneration is not performed. The valve is closed only to perform regeneration.

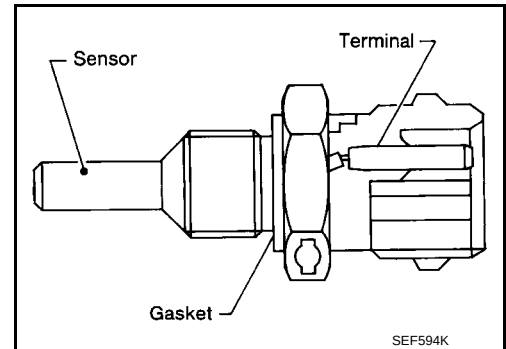
Based on the signal from throttle position sensor, ECM judges whether or not throttle control actuator operates properly.



Engine Coolant Temperature Sensor

INFOID:000000006106695

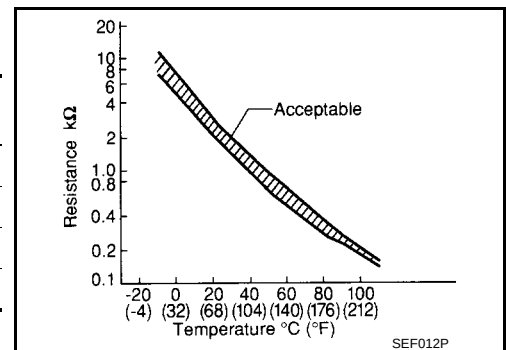
The engine coolant temperature (ECT) sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.3	0.68 - 1.00
90 (194)	1.0	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 185 (Engine coolant temperature sensor) and ECM terminal 159.



Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

INFOID:000000006106696

MASS AIR FLOW SENSOR

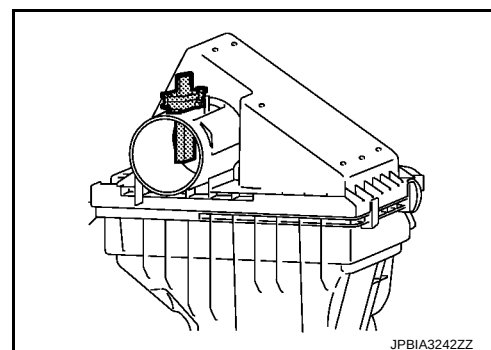
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[YD25DDTi]

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



INTAKE AIR TEMPERATURE SENSOR 1

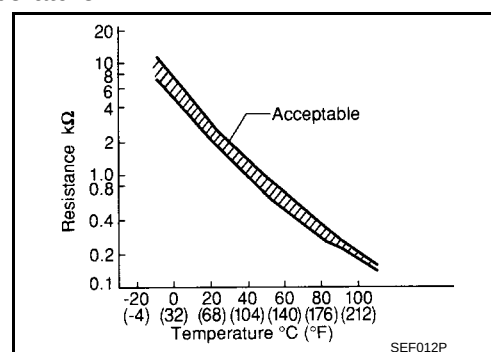
The intake air temperature (IAT) sensor 1 is built-into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	2.003 - 2.127
80 (176)	1.2	0.312 - 0.346

*: These data are reference values and are measured ECM terminals.

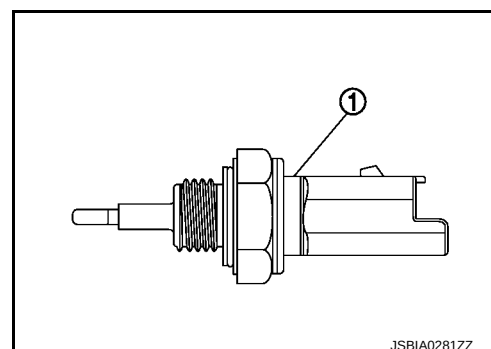


Intake Air Temperature Sensor 2

INFOID:000000006106697

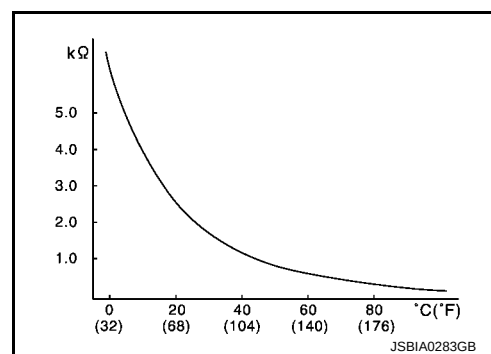
The intake air temperature (IAT) sensor 2 (1) detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

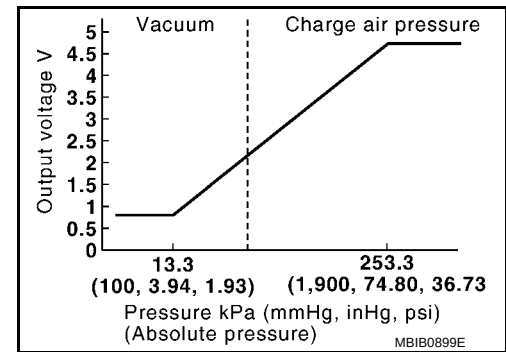
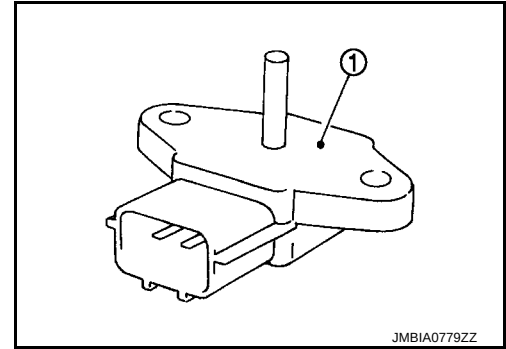
Intake air temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.438 - 2.588
80 (176)	0.312 - 0.346



TurboCharger Boost Sensor

INFOID:000000006106698

The turbocharger (TC) boost sensor (1) detects pressure in the charge air cooler outlet area. The sensor send to voltage signal to the ECM. As the pressure increases, the voltage rises.

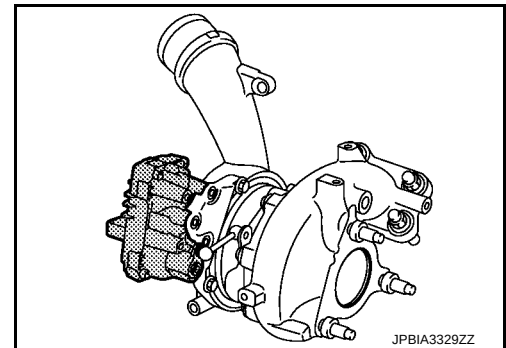


Turbocharger Boost Control Actuator

INFOID:000000006106699

The turbocharger Boost Control Actuator is integral with the turbo-charger and consists of the control unit, motor, and position sensor which detects gear system and rod position.

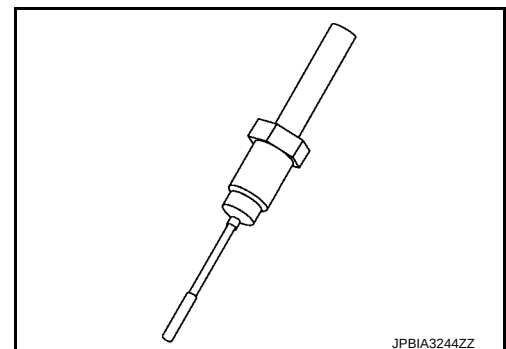
The turbocharger boost control actuator communicates with ECM via ENG communication, receives a target nozzle bane angle signal from ECM, and transmits position sensor signal and self-diagnosis information.



Exhaust Gas Temperature Sensor 1

INFOID:000000006106700

Exhaust gas temperature (EGT) sensor 1 is installed exhaust manifold. Exhaust gas temperature sensor 1 uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rises.



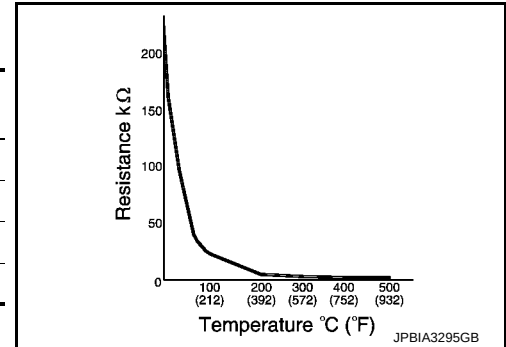
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[YD25DDTi]

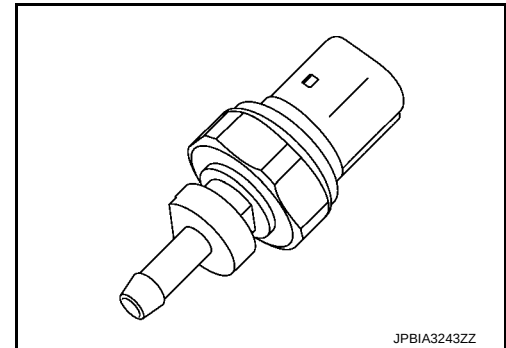
<Reference data>

Exhaust gas temperature [°C (°F)]	Voltage (V)	Resistance (kΩ)
100 (212)	4.7	18.2
200 (392)	4.0	4.0
400 (752)	2.0	0.65
600 (1112)	0.9	0.21



Exhaust Gas Pressure Sensor 1

Exhaust gas pressure sensor 1 is connected turbocharger with exhaust gas pressure tube. Exhaust gas pressure sensor 1 detects the exhaust gas pressure and send to voltage signal to the ECM. As the pressure increases, the voltage rises.



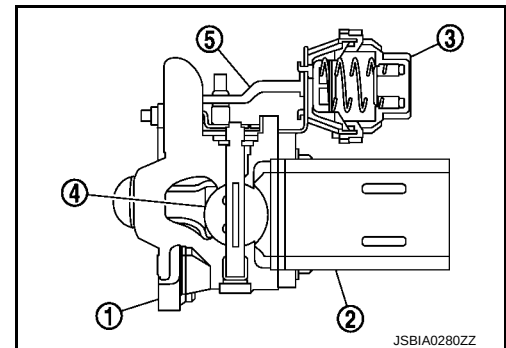
INFOID:000000006106701

EGR Volume Control Valve

The EGR volume control valve used a DC motor and controls the flow rate of EGR from exhaust manifold. ECM controls the DC motor to make the valve opening angle in response to driving conditions.

EGR Cooler Bypass Valve

EGR cooler bypass valve (1) is integral with the EGR cooler (2). this valve closes the EGR cooler bypass at the engine start and supplies gas not by way of the EGR cooler to raise combustion temperature efficiently. ECM controls the EGR cooler bypass valve to open the flap (4) via the rod (5).

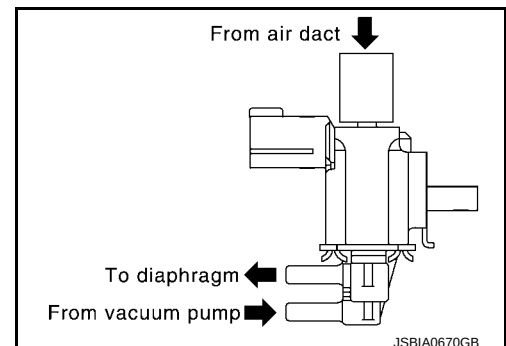


INFOID:000000006106702

EGR Cooler Bypass Valve Control Solenoid Valve

EGR cooler bypass valve control solenoid valve is controlled by ECM and controls negative pressure exerted on the diaphragm of the EGR cooler bypass valve.

When the EGR cooler bypass valve control solenoid valve is energized, the solenoid valve opens and negative pressure sent from the vacuum pump is exerted on the diaphragm of the EGR cooler bypass valve.



INFOID:000000006106704

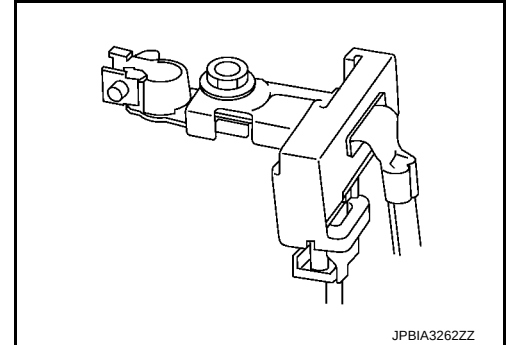
Battery Current Sensor (With Battery Temperature Sensor)

INFOID:000000006106705

OUTLINE

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator.

Based on sensor signals, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R.



CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

BATTERY CURRENT SENSOR

The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery.

BATTERY TEMPERATURE SENSOR

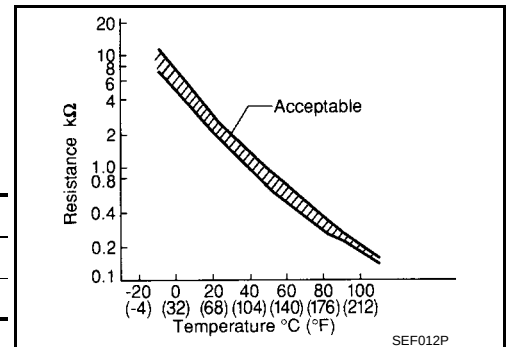
Battery temperature sensor is integrated in battery current sensor.

The sensor measures ambient temperature around the battery.

The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258



Cooling Fan (Motor Driven Type)

INFOID:000000006106706

Motor driven type cooling fan is applied with A/C models.

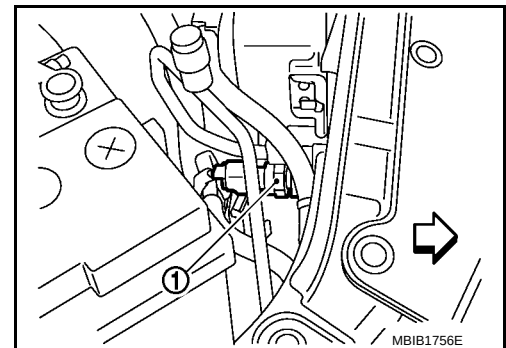
Cooling fan operates at low and high speed when the current flows in the cooling fan motor.

Refrigerant Pressure Sensor

INFOID:000000006106707

The refrigerant pressure sensor (1) is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

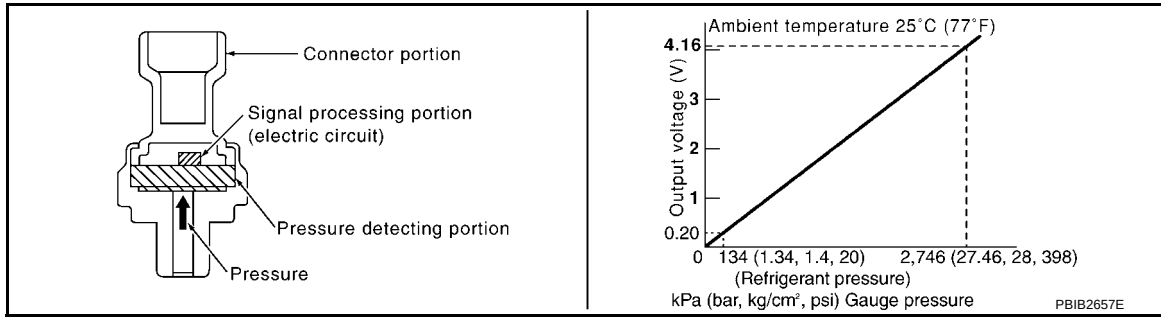
← : Vehicle front



COMPONENT PARTS

< SYSTEM DESCRIPTION >

[YD25DDTi]



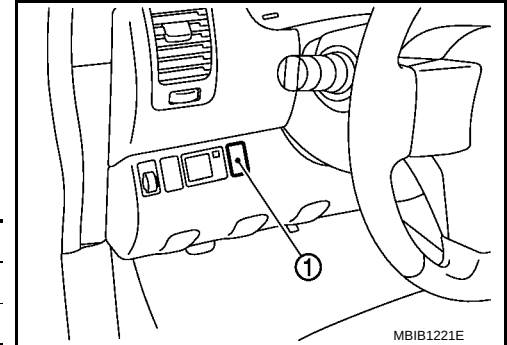
Heat Up Switch

INFOID:000000006106708

The heat up switch (1) is located on the lower side of the instrument panel. This switch is used to speed up the heater's operation when the engine is cold. When the ECM received the heat up switch ON signal, the ECM increases the engine idle speed to 1,400 rpm to warm up engine quickly.

This system works when all conditions listed below are met.

Heat up switch	ON
Shift lever	P or N (A/T), Neutral (M/T)
Accelerator pedal	Fully released



NOTE:

VIN < VSK***D40**393615 only

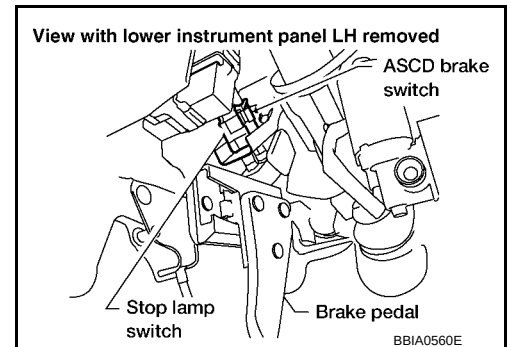
Stop Lamp Switch & ASCD Brake Switch

INFOID:000000006106709

Stop lamp switch and ASCD brake switch are installed to brake pedal bracket.

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON.

ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).



ASCD Steering Switch

INFOID:000000006106710

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Information Display

INFOID:000000006106711

The operation mode of the ASCD are indicated on the information display in the combination meter.

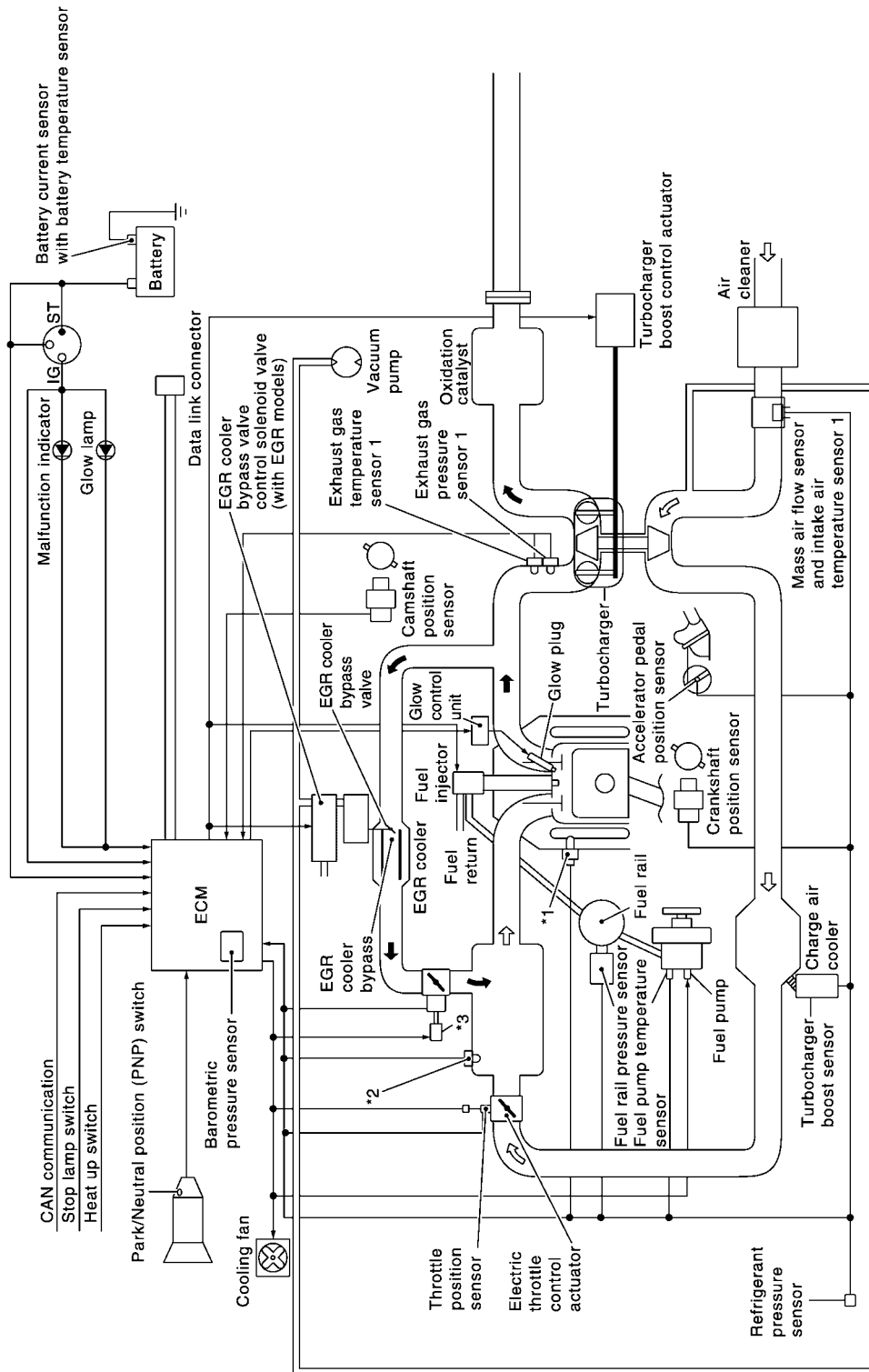
ECM transmits the ASCD status signal to the combination meter via CAN communication according to ASCD operation.

SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Diagram

INFOID:000000006106712



- *1 Engine coolant temperature sensor
- *2 Intake air temperature sensor 2
- *3 EGR volume control valve (with EGR models)

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ENGINE CONTROL SYSTEM : System Description

INFOID:000000006106713

ECM controls the engine by various functions.

SYSTEM

< SYSTEM DESCRIPTION >

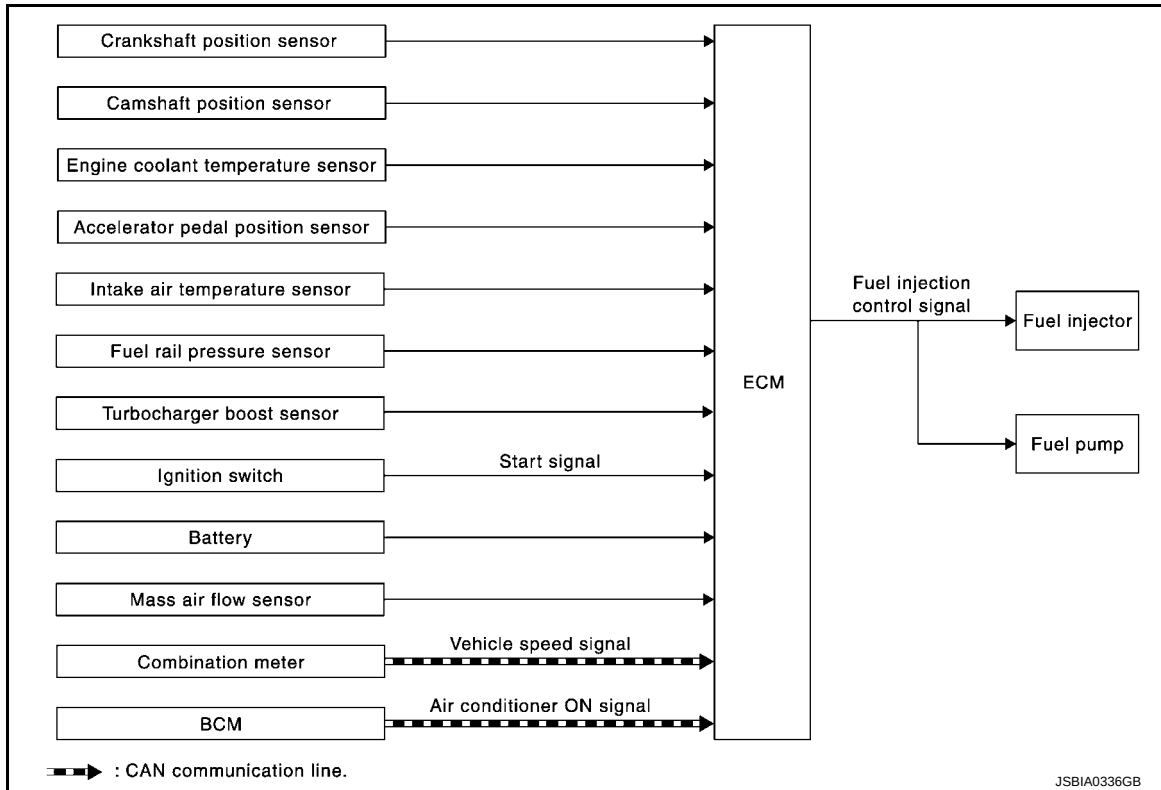
[YD25DDTi]

Function	Reference
Fuel Injection control	EC-929, "FUEL INJECTION CONTROL SYSTEM : System Description"
Turbocharger boost control	EC-932, "TURBOCHARGER BOOST CONTROL : System Description"
Glow control	EC-933, "GLOW CONTROL : System Description"
EGR	EC-934, "EGR SYSTEM : System Description"
Cooling fan control (models with A/C)	EC-936, "COOLING FAN CONTROL : System Description"
Air conditioning cut control (models with A/C)	EC-937, "AIR CONDITIONING CUT CONTROL : System Description"
ASCD (Auto speed control device)	EC-938, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"

FUEL INJECTION CONTROL SYSTEM

FUEL INJECTION CONTROL SYSTEM : System Diagram

INFOID:000000006106714



FUEL INJECTION CONTROL SYSTEM : System Description

INFOID:000000006106715

INPUT/OUTPUT SIGNAL CHART

SYSTEM

< SYSTEM DESCRIPTION >

[YD25DDTi]

×: Applicable

Sensor / unit	Input signal to ECM	ECM function						Actuator
		START CONTROL	IDLE CONTROL	NORMAL CONTROL	MAXIMUM AMOUNT CONTROL	DECELERATION CONTROL	FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)	
Crankshaft position sensor	Engine speed	×	×	×	×	×	×	- Fuel injector - Fuel pump
Camshaft position sensor	Piston position	×						
Engine coolant temperature sensor	Engine coolant temperature	×	×	×	×			
Accelerator pedal position sensor	Accelerator pedal position		×		×	×	×	
Intake air temperature sensor	Intake air temperature							
Fuel rail pressure sensor	Fuel rail pressure	×	×	×				
Turbocharger boost sensor	Turbocharger boost							
Ignition switch	Start signal	×						
Battery	Battery voltage		×					
Mass air flow sensor	Amount of intake air				×			
Combination meter	Vehicle speed*		×				×	
BCM	Air conditioner ON signal*		×					

*: This signal is sent to the ECM via CAN communication line.

DESCRIPTION

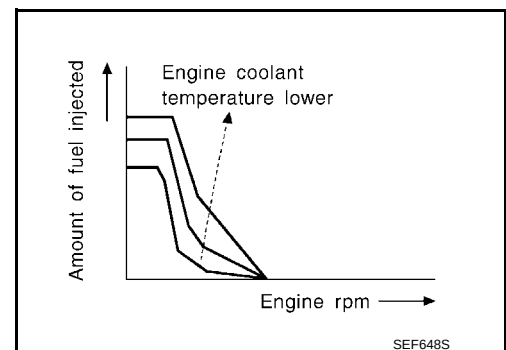
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.

Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

When ECM receives a start signal from the ignition switch, ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.

For better start ability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.

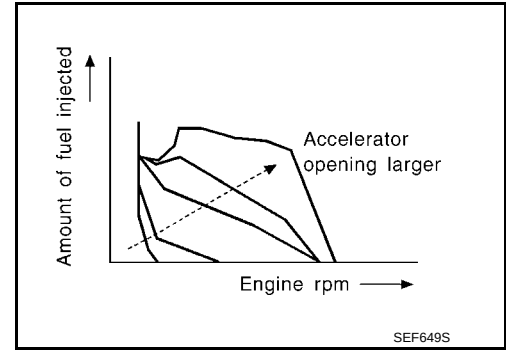


IDLE CONTROL

When ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to ECM.



MAXIMUM AMOUNT CONTROL

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions. This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

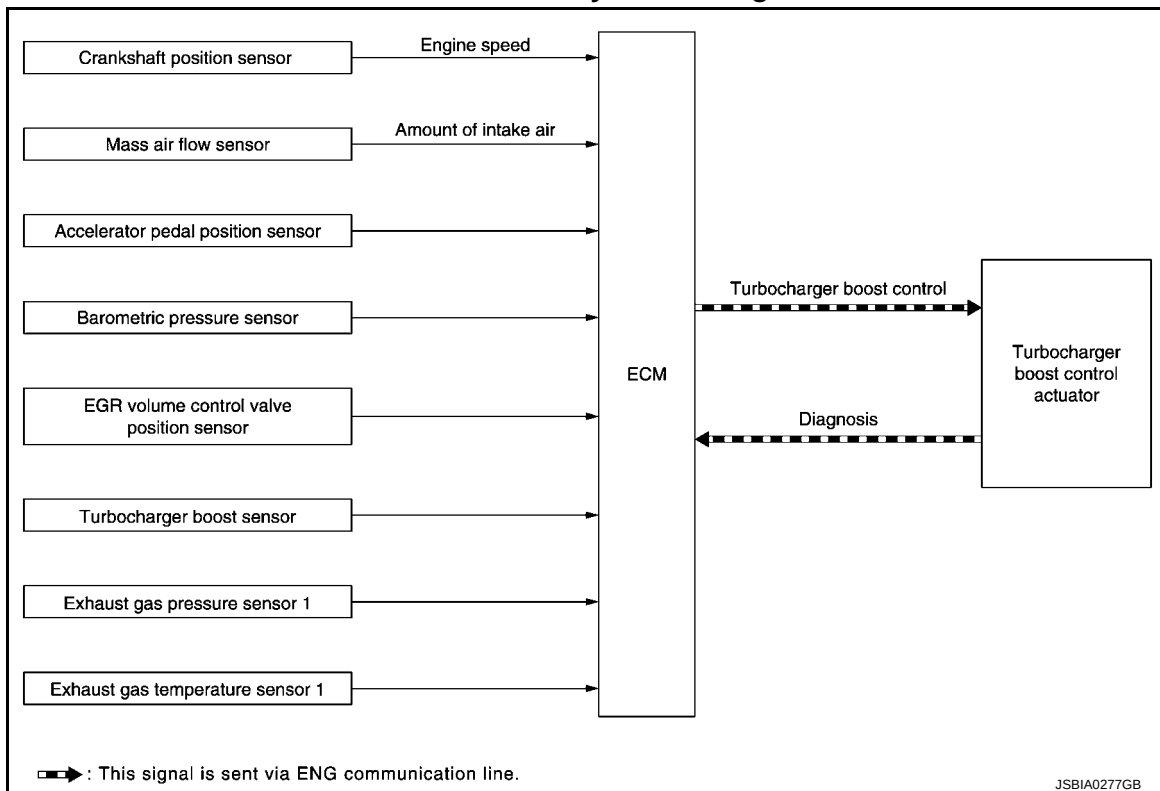
NOTE:

This function is different from deceleration control.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Diagram

INFOID:000000006106716



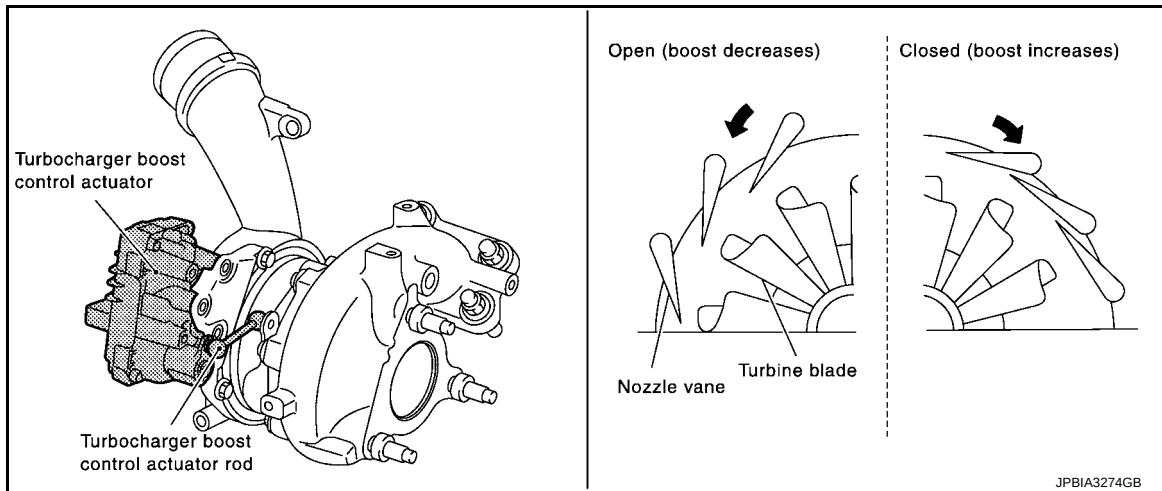
< SYSTEM DESCRIPTION >

TURBOCHARGER BOOST CONTROL : System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Turbocharger boost control	Turbocharger boost control actuator
Mass air flow sensor	Amount of intake air		
Accelerator pedal position sensor	Accelerator pedal position		
Barometric pressure sensor	Barometric pressure		
EGR volume control valve position sensor	EGR volume control valve position		
Turbocharger boost sensor	Turbocharger boost		
Exhaust gas pressure sensor 1	Exhaust gas pressure		
Exhaust gas temperature sensor 1	Exhaust gas temperature		

SYSTEM DESCRIPTION



The ECM controls the turbocharger boost control actuator according to driving conditions. The rod connected to the turbocharger boost control actuator changes the opening angles of the nozzle vanes located around the turbine blade.

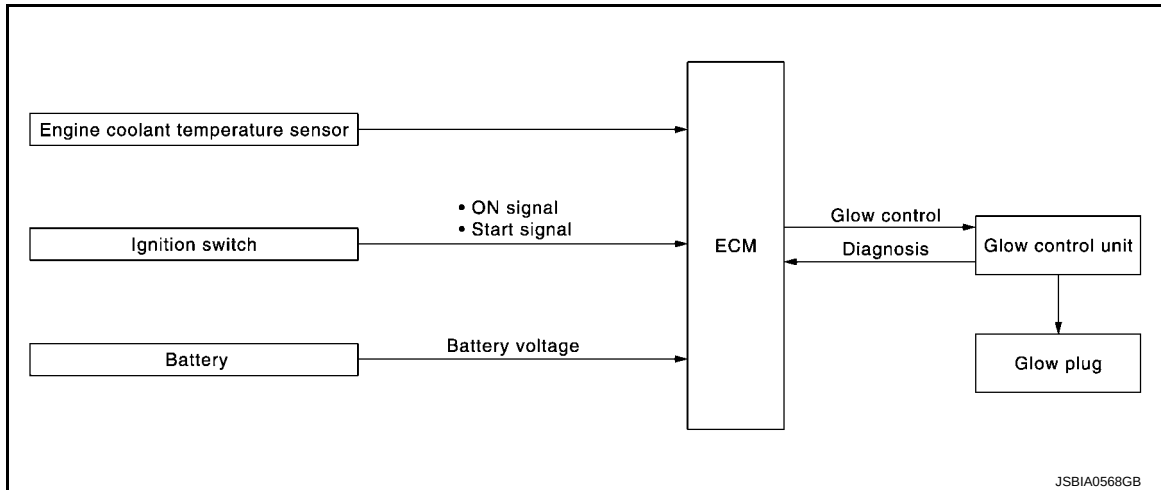
ECM determines a target boost pressure by an engine speed, accelerator pedal position, and barometric pressure. In addition, ECM calculates an intake air flow speed around the turbine entrance based on amount of air, exhaust gas pressure, exhaust gas temperature, and barometric pressure and determines the degree of the nozzle vane opening to satisfy the target boost pressure, according to the calculated intake air flow speed and an EGR volume control valve position. The determined nozzle vane angle signal is transmitted from ECM to the turbocharger boost control actuator via ENG communication. The turbocharger boost control actuator is activated based on the signal and opens the nozzle vane via the rod. Furthermore, more accurate control is enabled by transmitting the data of intake air flow around the turbine entrance from the turbocharger boost sensor to ECM.

The ECM opens the nozzle vane fully for turbocharger protection purposes when starting with engine cold. (VIN < VSK***D40**393615 only)

GLOW CONTROL

GLOW CONTROL : System Diagram

INFOID:000000006106718



GLOW CONTROL : System Description

INFOID:000000006106719

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Glow control	Glow control unit ↓ Glow plug
Ignition switch	ON signal		
	Start signal		
Battery	Battery voltage		

SYSTEM DESCRIPTION

ECM controls glow control unit via PWM signal communication.

- Ignition switch ON (Pre-glow)

After ignition switch has turned ON, the glow control unit turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug (Pre-glow time).

Pre-glow time

Engine coolant temperature [°C (°F)]	-40 (-40)	-20 (-4)	0 (32)	20 (68)	40 (104)	60 (140)	80 (176)
Glow time (Seconds)	40	40	40	20	20	20	0

- Cranking

The glow control unit turns ON, allowing current to flow through glow plug.

- Starting (After-glow)

After engine has started, current continues to flow through glow plug (After-glow time) for a certain period in relation to engine coolant temperature.

After-glow time

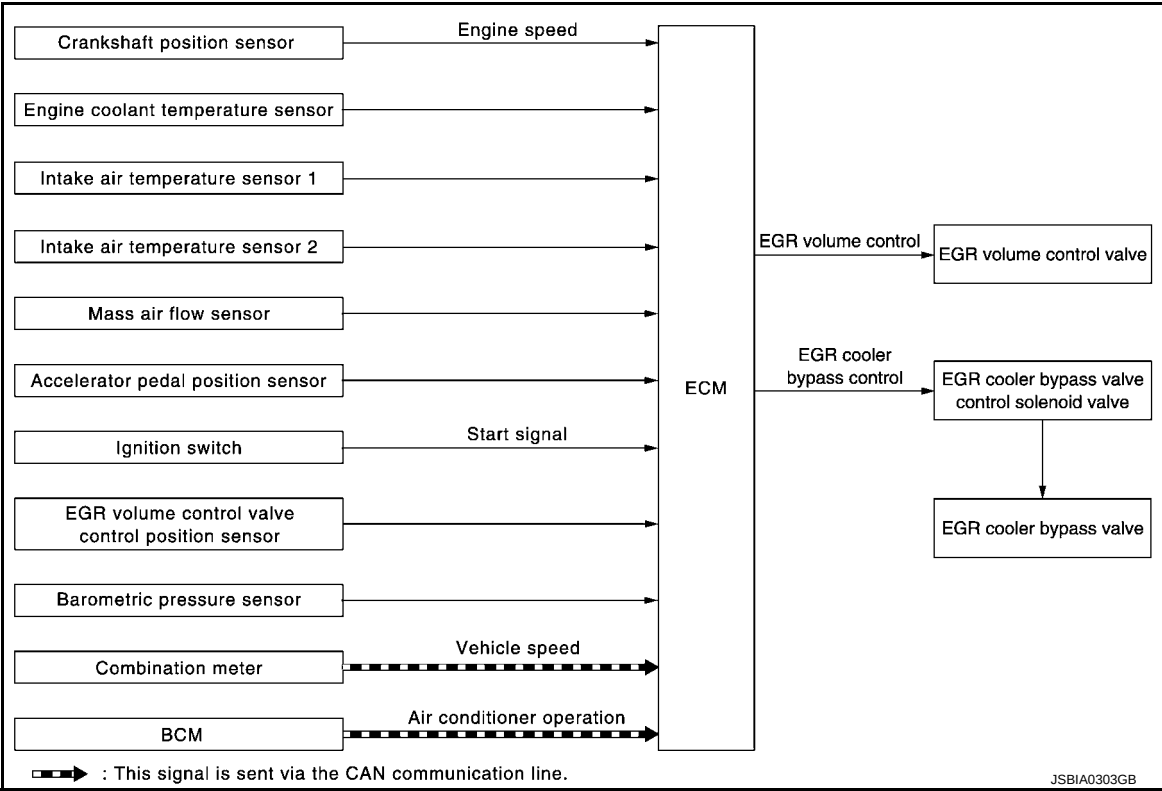
Engine coolant temperature [°C (°F)]	-40 (-40)	-20 (-4)	0 (32)	20 (68)	40 (104)	60 (140)	80 (176)
Glow time (Seconds)	800	800	560	180	30	0	0

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow control unit is turned ON.

EGR SYSTEM

EGR SYSTEM : System Diagram

INFOID:000000006106720



EGR SYSTEM : System Description

INFOID:000000006106721

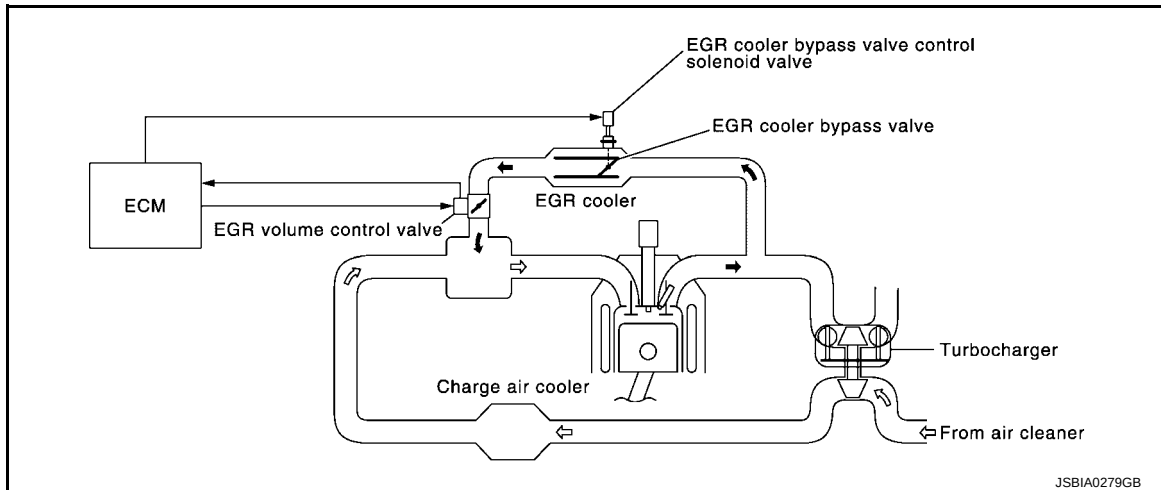
INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor 1	Intake air temperature		
Intake air temperature sensor 2	Intake air temperature		
Mass air flow sensor	Amount of intake air		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		
EGR volume control valve position sensor	EGR volume control valve position		
Barometric pressure sensor	Barometric pressure		
Combination meter	Vehicle speed*		
BCM	Air conditioner operation*		

*: This signal is sent to the ECM through CAN communication line.

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION



EGR VOLUME CONTROL

This system controls the flow rate of EGR led from exhaust manifold to intake manifold.

The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate.

A built-in DC motor moves the valve continuously corresponding to the ECM output signal.

The EGR volume control valve position sensor detects the valve position and sends the voltage signals to the ECM.

The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening angle of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

EGR COOLER CONTROL

The EGR cooler efficiently cools gas circulated in the EGR system and reduces the amount of NO_x contained in exhaust gases by lowering the combustion temperature. Furthermore, the adoption of the EGR cooler bypass valve allows the efficient rise in combustion temperature at engine start and the enhancement of combustion stability under low-load condition.

The EGR cooler bypass opens and closes fully according to the control that the ECM-controlled EGR cooler bypass valve control solenoid valve adjusts negative pressure applied on diaphragm of the EGR cooler bypass valve.

The EGR cooler bypass opens/closes based on an engine speed, engine load and engine coolant temperature.

Example:

Condition	EGR cooler bypass valve
Ignition switch OFF	OFF (Cooler mode)
Engine coolant temperature 115°C (239°F) or less with the engine at idle.	ON (Bypass mode)
Engine coolant temperature 45°C (113°F) or more with engine speed 2,200 rpm or more under no load condition.	OFF (Cooler mode)

COOLING FAN CONTROL

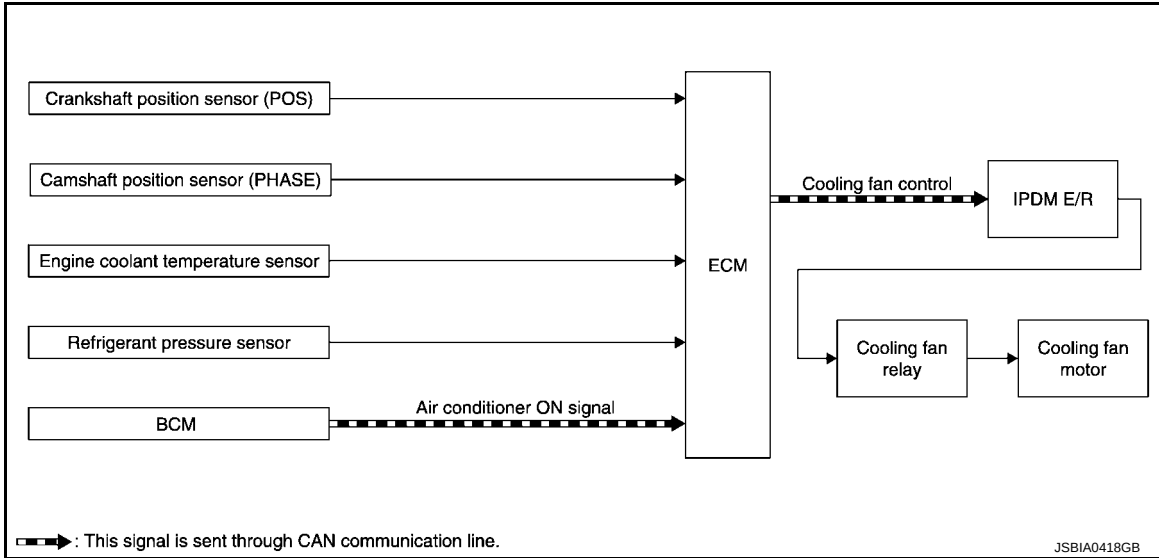
COOLING FAN CONTROL : System Diagram

INFOID:000000006106722

NOTE:

< SYSTEM DESCRIPTION >

Cooling fan control is applied with A/C models only.



COOLING FAN CONTROL : System Description

INFOID:000000006106723

NOTE:

Cooling fan control is applied with A/C models only.

INPUT/OUTPUT SIGNAL CHART

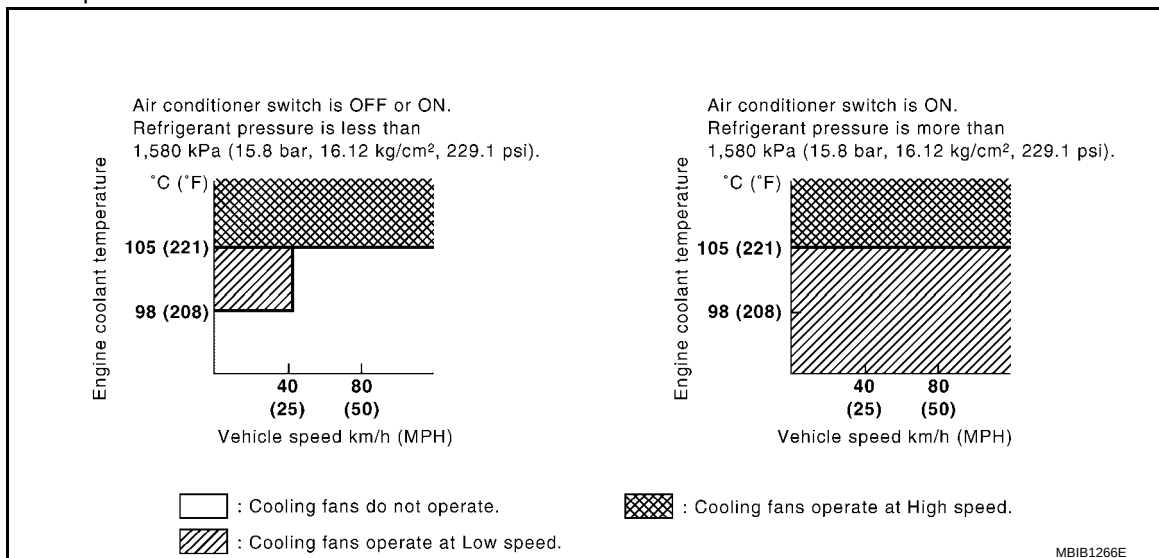
Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
BCM	Air conditioner ON signal*		

*: This signal is sent to ECM via CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

SYSTEM

< SYSTEM DESCRIPTION >

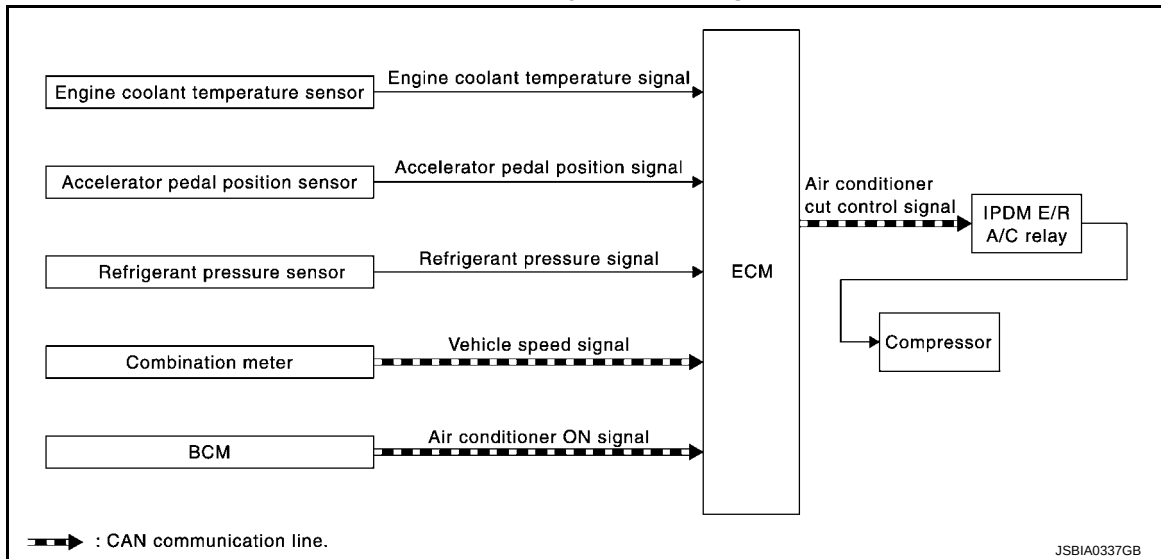
[YD25DDTi]

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:000000006106724



AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000006106725

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Air conditioner cut control	IPDM E/R (Air conditioner relay) ↓ A/C compressor
Accelerator pedal position sensor	Accelerator pedal position		
Refrigerant pressure sensor	Refrigerant pressure		
Combination meter	Vehicle speed*		
BCM	Air conditioner ON signal*		

*: This signal is sent to the ECM via CAN communication line.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the A/C compressor is turned OFF.

- When the accelerator pedal is fully depressed.
- When the engine coolant temperature becomes excessively high.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

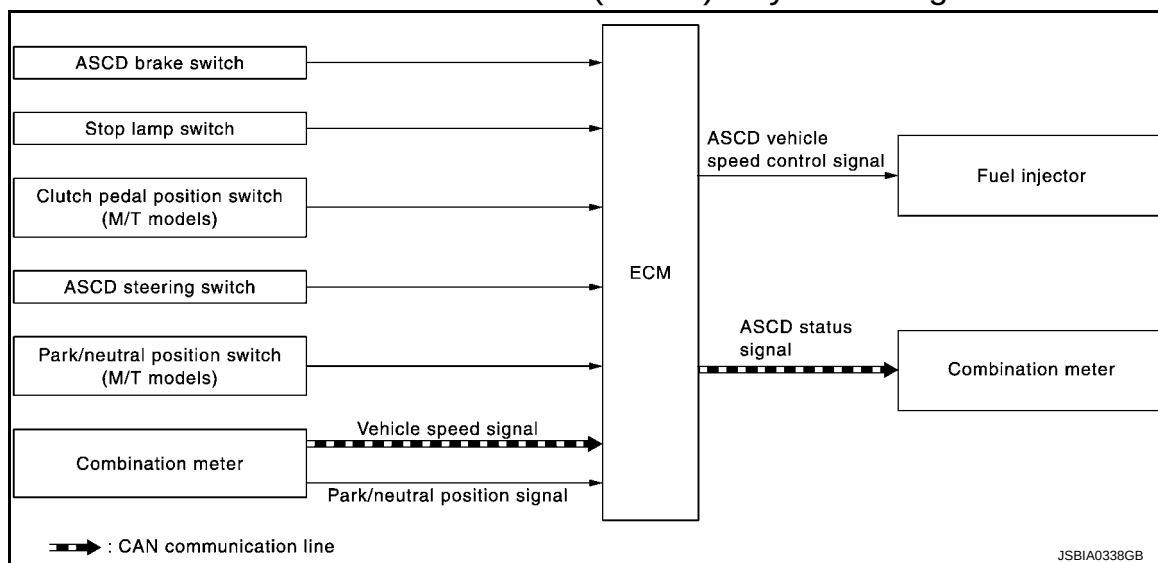
SYSTEM

< SYSTEM DESCRIPTION >

[YD25DDTi]

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:000000006106726



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000006106727

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD steering switch	ASCD steering switch operation	ASCD vehicle speed control	• Fuel injector • Fuel pump • Combination meter
ASCD brake switch	Brake pedal operation		
Stop lamp switch			
Clutch pedal position switch (M/T models)	Clutch pedal operation		
Park/neutral position switch (M/T models)	Park/neutral position		
Combination meter	• Vehicle speed* • Park/neutral position (A/T models)		

*: This signal is sent to the ECM via the CAN communication line

BASIC ASCD SYSTEM

- Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can be set the vehicle speed in the set speed range.
- ECM controls fuel injector and fuel pump to regulate engine speed.
- Operation status of ASCD is indicated in combination meter.
- If any malfunction occurs in the ASCD system, it automatically deactivates the ASCD control.

Refer to [EC-939, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : Switch Name and Function"](#) for ASCD operating instructions.

CAUTION:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

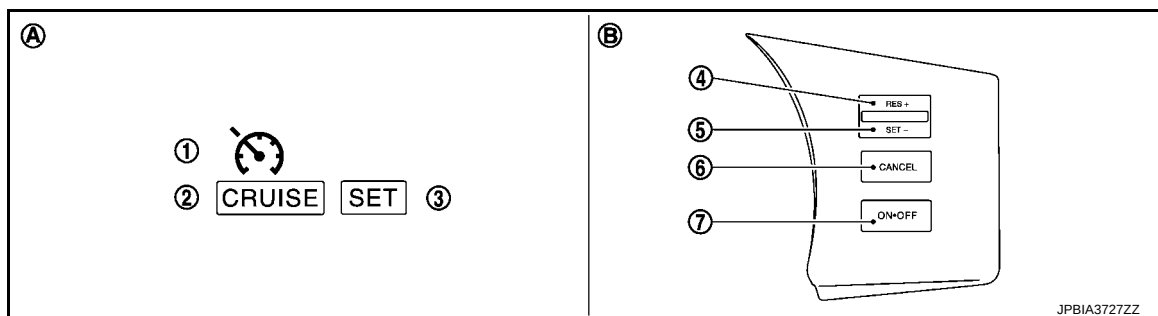
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:000000006106728

SWITCHES AND INDICATORS



1. CRUISE symbol	2. CRUISE indicator	3. SET indicator
4. RESUME/ACCELERATE switch (RES / +)	5. SET/COAST switch (SET / -)	6. CANCEL switch
7. ASCD MAIN switch		
A. On the combination meter (Information display)	B. On the steering wheel	

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
38 km/h (24 MPH)	160 km/h (100 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
RESUME/ACCELERATE switch (RES / +)	- Resumes the set speed. (SET indicator is turned ON when cruise control is set.) - Increases speed incrementally during cruise control driving.
SET/COAST switch (SET / -)	- Sets desired cruise speed. (SET indicator is turned ON when cruise control is set.) - Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system. (CRUISE symbol and CRUISE indicator are turned ON when ASCD system is ON.)

CANCEL CONDITION

- When any of following conditions exist, the cruise operation is canceled.
 - CANCEL switch is pressed
 - ASCD MAIN switch pressed (Set speed is cleared)
 - More than two switches at ASCD steering switch are pressed at the same time (Set speed is cleared)
 - Brake pedal is depressed
 - Selector lever position is changed to N, P or R (A/T models)
 - Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
 - Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
 - TCS system is operated
- When the ECM detects any of the following conditions, the ECM cancels the cruise operation and informs the driver.
 - Malfunction for some self-diagnoses regarding ASCD system. SET indicator is blinked quickly.

< SYSTEM DESCRIPTION >

- Engine coolant temperature is slightly higher than the normal operating temperature. Then CRUISE indicator is blinked slowly.

NOTE:

Engine coolant temperature decreases to the normal operating temperature, CRUISE indicator stop blinking and the cruise operation is able to work.

- When ASCD MAIN switch is turned to OFF during the cruise control driving, all of ASCD operations is canceled and vehicle speed memory is erased.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[YD25DDTi]

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Diagnosis Description

INFOID:000000006134335

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	ISO Standard
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979/ISO 15031-5
Freeze Frame data	Service \$02 of SAE J1979/ISO 15031-5
1st/2nd Trip Diagnostic Trouble Code (1st/2nd Trip DTC)	Service \$07 of SAE J1979/ISO 15031-5
Calibration ID	Service \$09 of SAE J1979/ISO 15031-5
Permanent Diagnostic Trouble Code (Permanent DTC)	Service \$0A* of SAE J1979/ISO 15031-5

*: Service \$0A is not applied for regions where it is not mandated.

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	2nd trip DTC	Freeze Frame data
CONSULT	×	×	×	×
GST	×	×	×	×
ECM	×	×	×	—

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in three consecutive trips (Three trip detection logic).

THREE TRIP DETECTION LOGIC AND ONE TRIP DETECTION LOGIC

On board diagnosis (OBD) system of this vehicle has “Three Trip Detection Logic” and “One Trip Detection Logic”. For which logic each self-diagnosis corresponds with, refer to [EC-970, "DTC Index"](#).

“Trip” of “Three Trip Detection Logic” means a driving mode in which the self-diagnosis is performed while driving.

Three Trip Detection Logic

When a malfunction is detected for the first time, 1st trip DTC and Freeze Frame data are stored in the ECM memory. MI does not illuminate at this stage. <1st trip>

When the same malfunction is detected again during the next driving, 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this stage. <2nd trip>

When the same malfunction is detected again at the third driving, DTC is stored in the ECM memory and 2nd trip DTC is cleared from the ECM memory. MI illuminates at the same time when DTC is stored. <3rd trip>

In other words, DTC is stored and MI illuminates when the same malfunction occurs in 3 consecutive trips. This is called “Three Trip Detection Logic”.

One Trip Detection Logic

When a malfunction is detected for the first time, DTC and Freeze Frame Data are stored in the ECM memory and MI lights up. This is called “One Trip Detection Logic”.

Some self-diagnoses will not illuminate MI when DTC is stored. (Refer to [EC-970, "DTC Index"](#).)

1st/2nd trip DTC is not stored for one trip detection logic.

DTC AND FREEZE FRAME DATA

DTC and 1st/2nd Trip DTC

The number of 1st/2nd trip DTC is the same as the number of DTC.

When a malfunction is detected during 1st trip, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this time. When the same malfunction is detected in the next trip (2nd trip), 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this time. In addition, DTC is stored in the ECM memory and MI lights up when the same malfunction is detected during the following consecutive trip (3rd trip).

The procedure for erasing DTC, 1st trip DTC, and 2nd trip DTC from the ECM memory is described in “How to Erase DTC”.

For malfunctions in which 1st/2nd trip DTC are displayed, Refer to [EC-970, "DTC Index"](#).

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1st/2nd trip DTC is specified in Service \$07 of ISO15031-5. 1st/2nd trip DTC detection occurs without lighting up MI and therefore does not warn the driver of a malfunction.

When 1st/2nd trip DTC is detected, check, print out or write down, and erase 1st/2nd trip DTC as specified with step 2 of Work Flow, refer to [EC-1032. "Work Flow"](#). Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, it is necessary to investigate the cause again.

Freeze Frame Data

ECM records driving conditions such as calculated load value, engine coolant temperature, engine speed, etc., at the moment a malfunction is detected.

The data stored together with DTC is called Freeze Frame Data, and is displayed on CONSULT or GST.

When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.

Only a set of Freeze Frame Data can be stored in the ECM memory. When ECM records Freeze Frame Data, and another Freeze Frame Data is generated after that, the first (original) Freeze Frame Data is not updated in ECM and it remains.

When the DTC is erased from ECM memory, Freeze Frame Data is erased with DTC. The procedure for erasing DTC is described in "How to Erase DTC".

How to Read DTC and 1st/2nd Trip DTC

DTC and 1st/2nd trip DTC can be read by the following procedures.

With CONSULT

With GST

CONSULT or GST (Generic Scan Tool): Examples: P0016, P0335, P1409, etc.

These numbers are prescribed by SAE J1979/ISO 15031-6.

(CONSULT also displays the malfunctioning parts and systems.)

No Tools

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0016, 0335, 1409, etc.

These DTCs are controlled by NISSAN.

- **1st/2nd trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify malfunction status. Therefore, using CONSULT (if available) is recommended.**

DTC and 1st/2nd trip DTC are displayed in the "SELF-DIAG RESULTS" mode of CONSULT.

"TIME" data indicates how many times the vehicle was driven after the last detection of DTC or 1st/2nd trip DTC. When DTC or 1st/2nd trip DTC has been detected currently, "TIME" becomes "CRNT" or "1t".

How to Erase DTC and 1st/2nd Trip DTC

With CONSULT

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 30 seconds and then turn it ON (engine stopped) again.

1. Select "ENGINE" with CONSULT.
2. Select "SELF-DIAG RESULTS".
3. Touch "ERASE". (DTC in ECM will be erased.)

WITH GST

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 30 seconds and then turn it ON (engine stopped) again.

1. Select Service \$04 with GST (Generic Scan Tool).

No Tools

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 30 seconds and then turn it ON (engine stopped) again.

1. Erase DTC in ECM. Refer to How to Erase Diagnostic Test Mode II (Self-diagnostic Results).
- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
 - **The following data are cleared when the ECM memory is erased.**
 - Diagnostic trouble codes
 - 1st/2nd trip diagnostic trouble codes

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- Freeze frame data

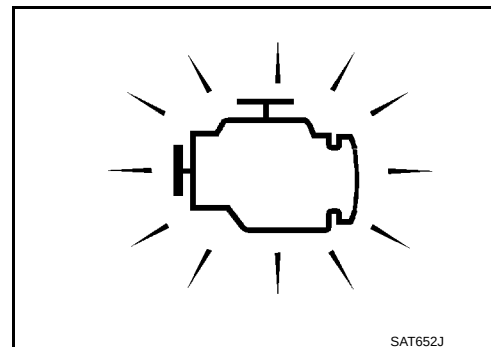
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

MALFUNCTION INDICATOR (MI)

Description

The MI is located on the combination meter.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
2. When the engine is started, the MI should go off.
If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a DTC is detected, the MI will light up to inform the driver that a malfunction has been detected.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st/2nd trip DTCs to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON.

Diagnostic Test Mode I — Malfunction Warning

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

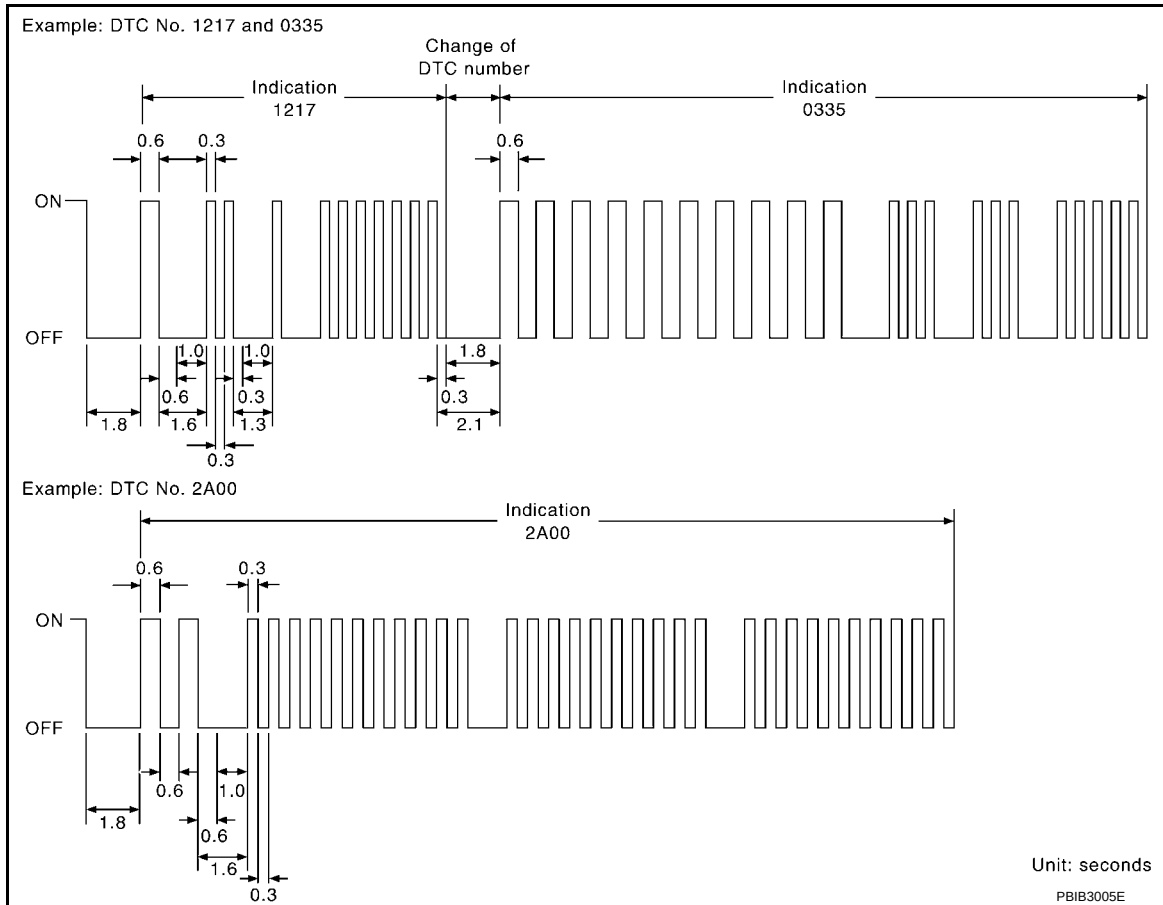
In this mode, the DTC and 1st/2nd trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st/2nd trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI

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illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st/2nd trip DTCs. DTC No. is same as that of 1st/2nd trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes as follows.

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-970. "DTC Index"](#))

How to Switch Diagnostic Test Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.

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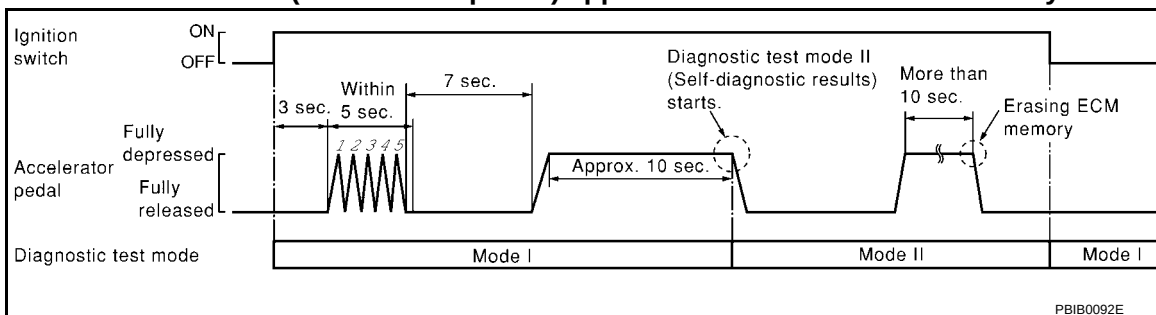
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ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

NOTE:

Wait until the same DTC (or 1st/2nd trip DTC) appears to confirm all DTCs certainly.



HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD SYSTEM OPERATION CHART

Relationship Between MI, 1st/2nd Trip DTC, DTC, and Detectable Items

- When the malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame Data are stored in the ECM memory.
- When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC and 2nd trip Freeze Frame Data are stored and 1st trip DTC and 1st trip Freeze Frame Data are cleared.
- When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored and MI illuminates. 1st/2nd trip DTC and 1st/2nd trip Freeze Frame Data are cleared from the ECM memory.
- MI will go off after the vehicle is driven 5 consecutive times with no malfunction (Driving pattern A).
- 1st/2nd trip DTC, DTC, and 1st/2nd trip Freeze Frame Data, Freeze Frame Data will be stored until the vehicle is driven 41 times (Driving pattern B) without the same malfunction recurring. "TIME" data displayed in the "SELF-DIAG RESULTS" mode of CONSULT shows the number of times the vehicle is driven without the same malfunction recurring.

Summary Chart

Items	Trip	Counter	Driving Pattern
MI (goes off)	5	2	A
DTC, Freeze Frame Data (clear)	41	40	B
1st/2nd Trip DTC, 1st/2nd Freeze Frame Data (clear)	41	40	B

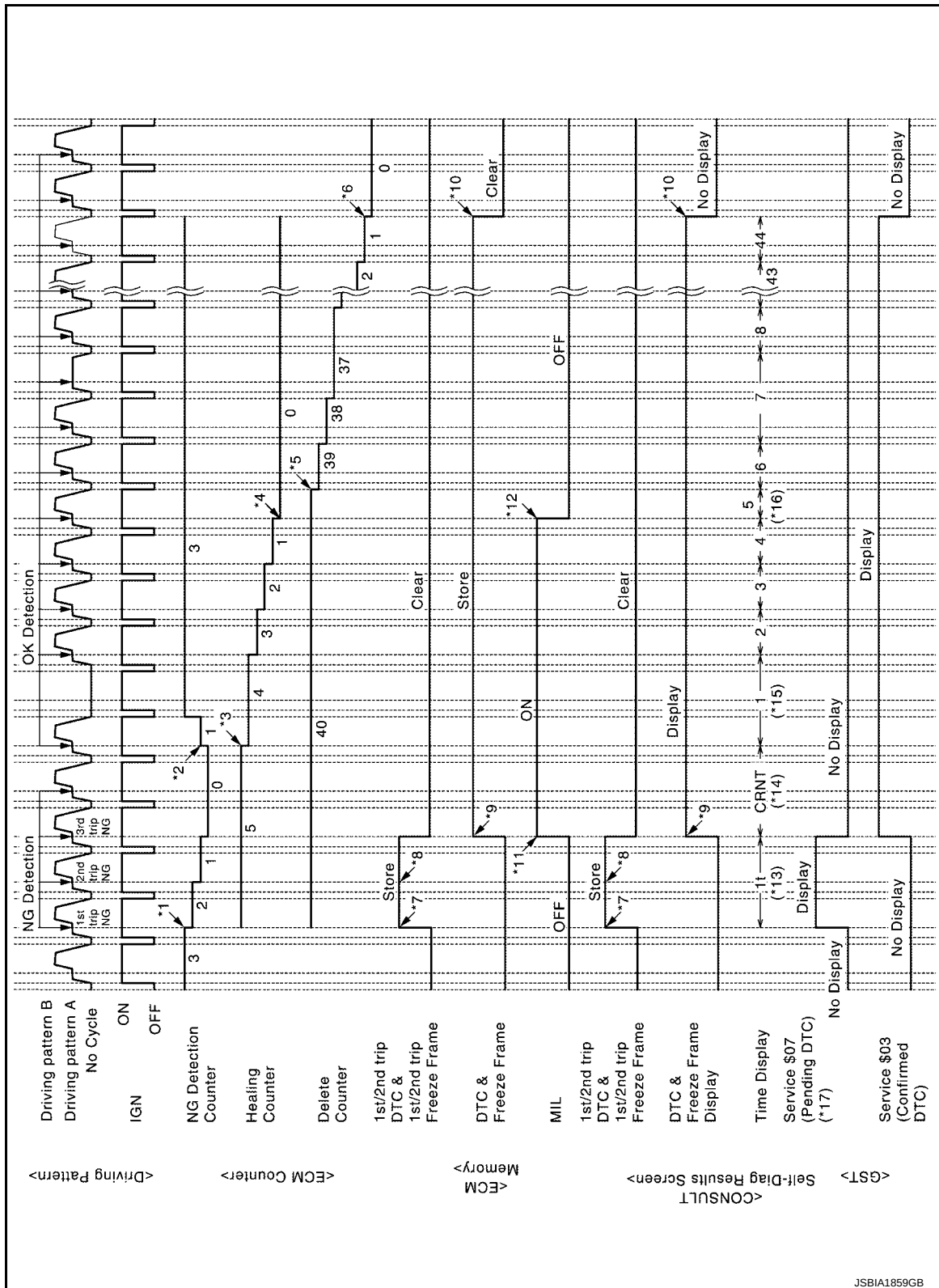
Refer to "<Driving Pattern A>" for details of pattern A and B.

Relationship between MI, DTC, 1st/2nd Trip DTC and Driving Patterns

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- *1: CONSULT displays for DTC and 1st/ 2nd trip DTC become the same.
 *2: 1st/2nd trip DTC becomes the same display in mode7 of GST.
 *3: When the same malfunction is detected in three consecutive trips, MI will light up.

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- *4: MI will go off after vehicle is driven 3 times (pattern A) without any malfunctions.
- *5: When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.
- *6: When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.
- *7: When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored.
- *8: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 41 times (pattern B) without the same malfunction.

<DRIVING PATTERN A>

Driving pattern A means the vehicle operation as follows:

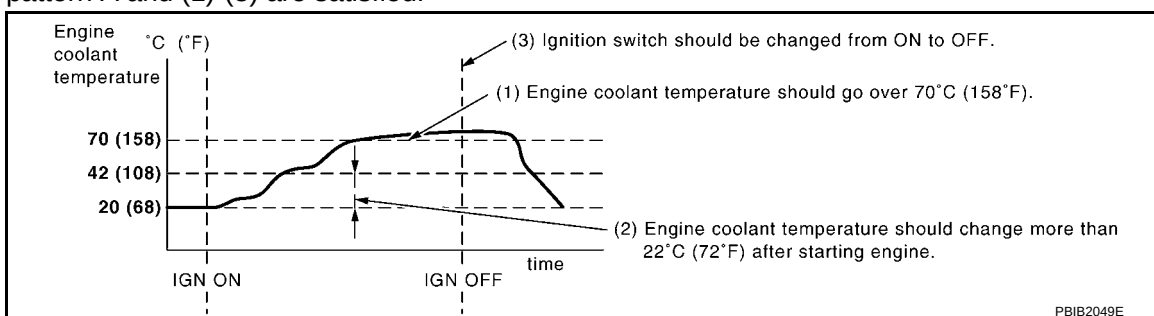
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The healing counter will be set when the malfunction is detected.
- The healing counter will be decrement when the same malfunction is not detected.
- The MI will go off when the healing counter reaches 3.

<DRIVING PATTERN B>

Driving pattern B means the vehicle operation as follows:

Driving pattern A and (1)-(3) are satisfied.



- The delete counter will be cleared when the malfunction is detected.
- The delete counter will be decrement when the same malfunction is not detected.
- The DTC will not be displayed after the delete counter reaches 0.

CONSULT Function

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FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results such as DTC and freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- Freeze frame data

WORK SUPPORT MODE

Work Item

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WORK ITEM	DESCRIPTION	USAGE
ENTER INJCTR CALIB DATA	Injector adjustment value is written onto ECM memory.	When performing Injector Adjustment Value Registration.
EGR/V LEARN CLR	EGR volume control valve learning value stored in ECM is cleared.	EGR volume control valve closed position learning value should be cleared under the following cases. - EGR volume control valve is removed. - EGR volume control valve is replaced.
CONFIG CLR	ASCD and ESP application status stored in ECM is initialized. NOTE: After the status is initialized, ECM recognizes ASCD and ESP application status when the following conditions are met. - For ASCD: ASCD MAIN switch is pressed. - For ESP: ESP switch* is ON.	When initializing ASCD and ESP application status stored in ECM.
FUEL INJ QUANTITY LEARNING	Adjustment of fuel injection quantity under various conditions.	Injector fuel injection quantity learning must be performed after the following cases. - Injector(s) are replaced. - ECM is replaced.
INJ ADJ VAL CLR	Injector adjustment value stored in ECM is initialized.	Before changing injector adjustment value stored in ECM, it is recommended to perform this work item.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC and 1st/2nd trip DTC, refer to [EC-970. "DTC Index"](#).

Freeze Frame Data

Freeze frame data item	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to EC-970. "DTC Index" .)
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	The intake manifold pressure at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
FUEL/R PRESS [kPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
MASS AIRFLOW [g/s]	The mass air flow at the moment a malfunction is detected is displayed.

DATA MONITOR MODE

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Monitored item	Unit	Description	Remarks
CKPS-RPM (TDC)	rpm	The engine speed computed from the crankshaft position sensor signal is displayed.	
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN	°C or °F	The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN	V	The accelerator pedal position sensor 1 signal voltage is displayed.	
ACCEL SEN 2	V	The accelerator pedal position sensor 2 signal voltage is displayed.	
ACT CR PRESS	MPa	The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position switch signal.	
START SIGNAL	ON/OFF	indicates [ON/OFF] condition from the starter signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
BRAKE SW	ON/OFF	indicates [ON/OFF] condition from the stop lamp switch signal.	
BRAKE SW2	ON/OFF	indicates [ON/OFF] condition from the ASCD brake switch signal.	
IGN SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
WARM UP SW	[ON/OFF]	Indicates [ON/OFF] condition from heat up switch signal.	
MAS AIR/FL SE	V	The signal voltage of the mass air flow sensor is displayed.	
MAIN INJ WID	msec	Indicates the actual main fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT	mA	Indicates the fuel pump power supply current from the ECM.	
GLOW RLY	ON/OFF	The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN	LOW/HI/OFF	Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW: Operates at low speed. HI: Operates at high speed. OFF: Stopped	
COOLING FAN	LOW/HI/OFF	Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW: Operation. HI: Operation. OFF: Stopped	
INT/A VOLUME	mg/	The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN	kPa	The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	

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Monitored item	Unit	Description	Remarks
INT/M PRES SE	kPa	Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
CYL COUNT	1/2/3/4	The cylinder being injected is displayed. 1: Cylinder No.1 is injected. 2: Cylinder No.2 is injected. 3: Cylinder No.3 is injected. 4: Cylinder No.4 is injected.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET/COAST switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
E/R AIR TMP/S	°C or °F	NOTE: The item is indicated, but not monitored.	
FR EX TMP SEN	°C or °F	The exhaust gas temperature (determined by the signal voltage of the exhaust gas temperature sensor) is displayed.	
ASCD APPLY	YES/NO	Displaying ASCD application status stored in ECM.	
VDC APPLY	YES/NO	Displaying ESP application status stored in ECM.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
ETC OPEN ANGL	deg	The opening angle of Electric throttle control actuator is displayed.	
THRTL SEN	V	The throttle position sensor signal voltage is displayed.	
EGR/V ANGLE	°	- The opening angle of EGR volume control valve is displayed. - The opening becomes larger as the value increases.	
EGR V/POS SEN	mV	The EGR volume control valve control position sensor signal voltage is displayed.	
ALTERNATOR DUTY	%	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
BATTERY TEMP SEN	V	The battery temperature sensor signal voltage is displayed.	
EXH GAS PRS SEN 1	V	The exhaust gas pressure sensor 1 signal voltage is displayed.	
BAT CURRENT SEN	V	The battery current sensor signal voltage is displayed.	
INJ Q/L CYL 1 - A	—	The fuel injection quantity learning value in the fuel injection area A of cylinder 1 is displayed.	
INJ Q/L CYL 2 - A	—	The fuel injection quantity learning value in the fuel injection area A of cylinder 2 is displayed.	
INJ Q/L CYL 3 - A	—	The fuel injection quantity learning value in the fuel injection area A of cylinder 3 is displayed.	
INJ Q/L CYL 4 - A	—	The fuel injection quantity learning value in the fuel injection area A of cylinder 4 is displayed.	
INJ Q/L CYL 1 - B	—	The fuel injection quantity learning value in the fuel injection area B of cylinder 1 is displayed.	

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Monitored item	Unit	Description	Remarks
INJ Q/L CYL 2 - B	—	The fuel injection quantity learning value in the fuel injection area B of cylinder 2 is displayed.	A
INJ Q/L CYL 3 - B	—	The fuel injection quantity learning value in the fuel injection area B of cylinder 3 is displayed.	EC
INJ Q/L CYL 4 - B	—	The fuel injection quantity learning value in the fuel injection area B of cylinder 4 is displayed.	
INJ Q/L CYL 1 - C	—	The fuel injection quantity learning value in the fuel injection area C of cylinder 1 is displayed.	C
INJ Q/L CYL 2 - C	—	The fuel injection quantity learning value in the fuel injection area C of cylinder 2 is displayed.	D
INJ Q/L CYL 3 - C	—	The fuel injection quantity learning value in the fuel injection area C of cylinder 3 is displayed.	
INJ Q/L CYL 4 - C	—	The fuel injection quantity learning value in the fuel injection area C of cylinder 4 is displayed.	E
INJ Q/L CYL 1 - D	—	The fuel injection quantity learning value in the fuel injection area D of cylinder 1 is displayed.	F
INJ Q/L CYL 2 - D	—	The fuel injection quantity learning value in the fuel injection area D of cylinder 2 is displayed.	
INJ Q/L CYL 3 - D	—	The fuel injection quantity learning value in the fuel injection area D of cylinder 3 is displayed.	G
INJ Q/L CYL 4 - D	—	The fuel injection quantity learning value in the fuel injection area D of cylinder 4 is displayed.	H
KICKDOWN POSI	ON/OFF	Indicates [ON/OFF] condition of kickdown determined by the ECM according to the input signals.	
ALT DUTY SIGNAL	ON/OFF	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	I
LOAD SIGNAL	ON/OFF	Indicates [ON/OFF] condition from the electrical load signal. • ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. • OFF: Both rear window defogger switch and lighting switch are OFF.	J K

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	- Engine: After warming up, idle the engine. - A/C switch: OFF - Shift lever: Neutral position - Cut off each injector signal one at a time using CONSULT.	Engine runs rough or dies.	- Harness and connectors - Compression - Fuel injector
COOLING FAN *	- Ignition switch: ON - Operate the cooling fan at LOW, HI speed and turn OFF using CONSULT.	Cooling fan moves at LOW, HI speed and stops.	- Harness and connectors - Cooling fan motor - Cooling fan relay
ENG COOLANT TEMP	- Engine: Return to the original trouble condition - Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
GLOW RLY	- Ignition switch: ON (Engine stopped) - Turn the glow relay ON and OFF using CONSULT and listen to operating sound.	Glow relay makes the operating sound.	- Harness and connectors - Glow relay
FUEL/T TEMP SEN	- Engine: Return to the original trouble condition - Change the fuel tank temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel tank temperature sensor - Fuel injector
INJ TIMING	- Engine: After warming up, idle the engine. - A/C switch: OFF - Shift lever: Neutral position - Change the main fuel injection timing using CONSULT.	Engine runs rough or dies.	- Harness and connectors - Fuel injector
PRES REGULATOR	- Ignition switch: ON - Change fuel rail pressure using CONSULT.	Fuel leaks.	- Fuel line - Fuel pressure relief valve
PUMP LEARN T CLEAR	This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-1043, "Description".		
TEARGET ETC ANGLE	- Ignition switch: ON - Change electric throttle control actuator opening angle using CONSULT.	The opening angle of throttle valve is changed properly.	- Harness and connectors - Electric throttle control actuator
TRG EGR/V ANGLE	- Ignition switch: ON - Change EGR volume control valve opening angle (within the range of 0 - 70°) using CONSULT.	EGR volume control valve makes an operating sound.	- Harness and connectors - EGR volume control valve
TC BOOST CONTROL	- Ignition switch: ON - Change operating angle of turbocharger boost control actuator.	Turbocharger boost control rod is moved.	- Harness and connectors - Turbocharger boost control actuator
EGR COOLER BYPASS VALVE	- Engine: Running - Operate the EGR cooler bypass valve.	EGR cooler bypass valve control rod is moved.	- Harness and connectors - EGR cooler bypass valve - EGR cooler bypass valve control solenoid valve

*:Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

Diagnosis Tool Function

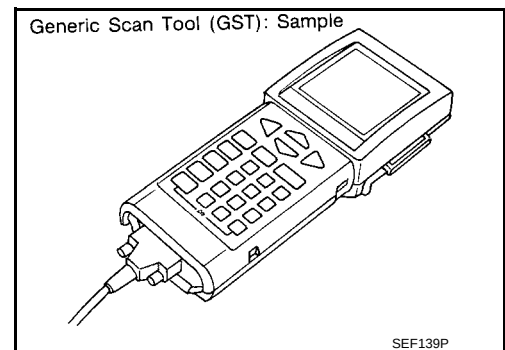
INFOID:000000006106731

DESCRIPTION

Generic Scan Tool (OBD-II scan tool) complying with SAE J1978/ISO 15031-4 has 7 different functions explained below.

ISO15765-4 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.



FUNCTION

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

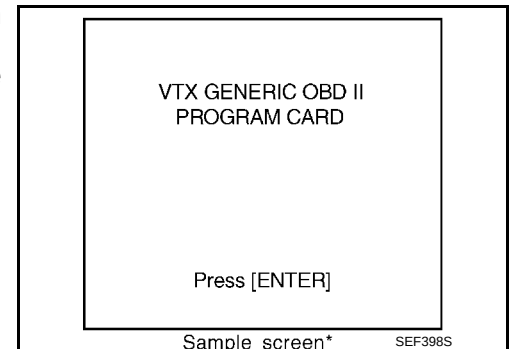
[YD25DDTi]

Diagnostic Service		Function
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame.
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$07)
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.
Service \$0A*	PERMANENT DTCs	This diagnostic service gains access to permanent DTCs which were stored by ECM.

*: Service \$0A is not applied for regions where it is not mandated.

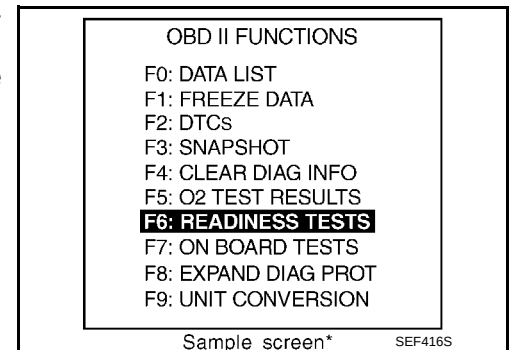
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector, which is located under drivers side dash panel.
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:000000006106732

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- * Specification data may not be directly related to their components signals/values/operations.

MONITOR ITEM	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	• Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	• Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87 V
		Accelerator pedal: Fully depressed	More than 4.3 V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.28 - 0.48 V
		Accelerator pedal: Fully depressed	More than 2.0 V
ACT CR PRESS	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T), Neutral (M/T) • No load	Idle	25 – 35 MPa
		2,000 rpm	40 – 50 MPa
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 – 14 V
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
IGN SW	• Ignition switch: ON → OFF		ON → OFF
WARM UP SW	• Ignition switch: ON	Heat up switch: OFF	OFF
		Heat up switch: ON	ON
MAS AIR/FL SE*	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T), Neutral (M/T) • No load	Ignition switch: ON (Engine stopped)	Approx. 0.4 V
		Idle	0.8 – 1.3 V
		Engine is revving from idle to about 4,000 rpm.	0.8 – 1.3 V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Idle speed	No load	0.50 – 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 – 0.80 msec
PUMP CURRENT	- Engine: After warming up - Air conditioner switch: OFF - Shift lever: P or N (A/T), Neutral (M/T) - No load	Idle	1,600 – 2,000 mA
		2,000 rpm	1,500 – 1,900 mA
GLOW RLY	Refer to EC-933, "GLOW CONTROL : System Description" .		
COOLING FAN	When cooling fan is stopped.		OFF
	When cooling fans operate at low speed.		LOW
	When cooling fans operate at high speed.		HI
INT/A VOLUME	Engine: After warming up, idle the engine		150 - 450 mg/
BARO SEN	Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)
INT/M PRES SE	- Engine: After warming up - Air conditioner switch: OFF - Shift lever: P or N (A/T), Neutral (M/T) - No load	Idle	Approx. 100.00 kPa
		3,600 rpm	Approx. 140.00 kPa
		4,000 rpm	Approx. 135.00 kPa
VHCL SPEED SE	Turn drive wheels and compare speedometer indication with the CONSULT value.		Almost the same speed as the CONSULT value
SET VHCL SPD	Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
CYL COUNT	Engine is running		1 → 3 → 4 → 2
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
MAIN SW	Ignition switch: ON	ASCD MAIN switch: Pressed	ON
		ASCD MAIN switch: Released	OFF
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 – 65,535 km (0 – 40,723 mile)
E/R AIR TMP/S	Not used		
FR EX TMP SEN	Engine: After warming up		More than 120°C (248°F)
RR EX TMP SEN	Not used		

ECM

< ECU DIAGNOSIS INFORMATION >

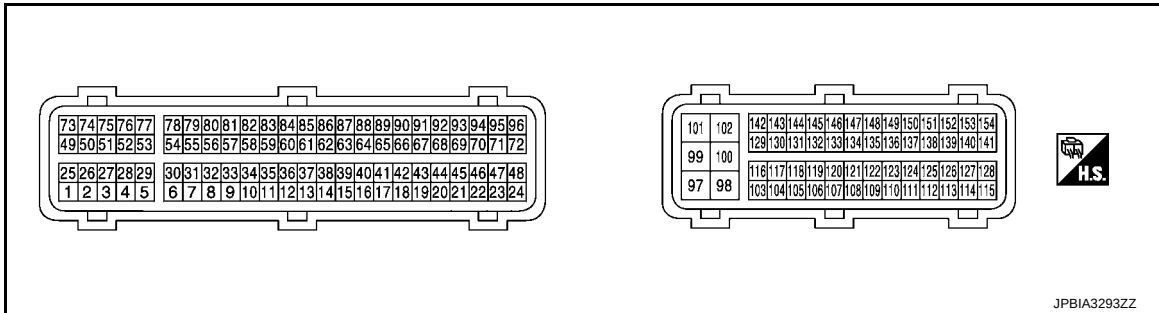
[YD25DDTi]

MONITOR ITEM	CONDITION		SPECIFICATION
ASCD APPLY	• Ignition switch: ON	Models with ASCD	YES
		Models without ASCD	NO
VDC APPLY	• Ignition switch: ON	Models with ESP	YES
		Models without ESP	NO
AC PRESS SEN	- Engine: Idle - Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 – 4.0V
ETC OPEN ANGL	• Ignition switch: ON		84.0°
THRTL SEN	• Ignition switch: ON		3.35 – 4.55 V
EGR/V ANGLE	• Ignition switch: ON (Engine stopped)		Approx. 0°
EGR V/POS SEN	• Ignition switch: ON (Engine stopped)		1,050 – 1,350 mV
BAT CURRENT SEN	- Engine speed: Idle - Battery: Fully charged - Selector lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load		Approx. 2,600 – 3,500 mV
INJ Q/L CYL 1 - A	• Ignition switch: ON		–0.067 – 0.090
INJ Q/L CYL 2 - A	• Ignition switch: ON		–0.067 – 0.090
INJ Q/L CYL 3 - A	• Ignition switch: ON		–0.067 – 0.090
INJ Q/L CYL 4 - A	• Ignition switch: ON		–0.067 – 0.090
INJ Q/L CYL 1 - B	• Ignition switch: ON		–0.032 – 0.053
INJ Q/L CYL 2 - B	• Ignition switch: ON		–0.032 – 0.053
INJ Q/L CYL 3 - B	• Ignition switch: ON		–0.032 – 0.053
INJ Q/L CYL 4 - B	• Ignition switch: ON		–0.032 – 0.053
INJ Q/L CYL 1 - C	• Ignition switch: ON		–0.018 – 0.038
INJ Q/L CYL 2 - C	• Ignition switch: ON		–0.018 – 0.038
INJ Q/L CYL 3 - C	• Ignition switch: ON		–0.018 – 0.038
INJ Q/L CYL 4 - C	• Ignition switch: ON		–0.018 – 0.038
INJ Q/L CYL 1 - D	• Ignition switch: ON		–0.017 – 0.034
INJ Q/L CYL 2 - D	• Ignition switch: ON		–0.017 – 0.034
INJ Q/L CYL 3 - D	• Ignition switch: ON		–0.017 – 0.034
INJ Q/L CYL 4 - D	• Ignition switch: ON		–0.017 – 0.034
KICKDOWN POSI	• Ignition switch: ON	Accelerator pedal: Fully released	OFF
		Accelerator pedal: Fully depressed	ON
ALT DUTY SIGNAL	Power generation voltage variable control: Operating		ON
	Power generation voltage variable control: Not operating		OFF
LOAD SIGNAL	Both rear window defogger switch and lighting switch: OFF		OFF
	Rear window defogger switch: ON and/or lighting switch: 2nd		ON

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

TERMINAL LAYOUT



PHYSICAL VALUES

Connect a break-out box and Y-cable adapter between the ECM and ECM harness connector.

- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

NOTE:

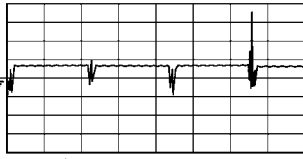
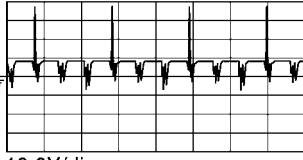
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- * Specification data may not be directly related to their components signals/values/operations.

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
1 (B)	114 (B)	Fuel injector power supply (Cylinder No. 2)	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div 10.0V/div JSBIA0425ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div 10.0V/div JSBIA0426ZZ
3 (W)	114 (B)	Fuel injector (Cylinder No. 2)	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div 10.0V/div JSBIA0427ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div 10.0V/div JSBIA0428ZZ

ECM

< ECU DIAGNOSIS INFORMATION >

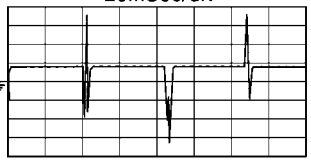
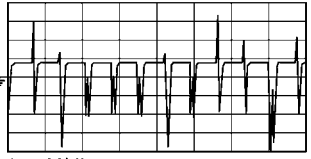
[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
5 (G)	6 (B)	Exhaust gas temperature sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	0.3 – 5.0 V Voltage varies with exhaust gas temperature
6 (B)	—	Exhaust gas temperature sensor 1 ground	—	—	—
7 (B)	—	Fuel pump temperature sensor ground	—	—	—
9 (V)	—	EGR volume control valve position sensor ground	—	—	—
10 (B)	—	ASCD steering switch ground	—	—	—
12 (BR)	—	Throttle position sensor ground	—	—	—
13 (BR)	—	Refrigerant pressure sensor ground	—	—	—
14 (O)	—	Intake air temperature sensor 1 ground	—	—	—
15 (LG)	—	Engine coolant temperature sensor ground	—	—	—
16 (W)	—	Fuel rail pressure sensor ground	—	—	—
17 (—)	—	Sensor ground 1 (Sensor shield circuit)	—	—	—
18 (B)	—	Camshaft position sensor ground	—	—	—
19 (B)	—	Crankshaft position sensor ground	—	—	—
20 (B)	13 (BR)	Refrigerant pressure sensor power supply	—	[Ignition switch: ON]	5.0 V
21 (B)	54 (B)	Exhaust gas pressure sensor 1 power supply	—	[Ignition switch: ON]	5.0 V
22 (W)	19 (B)	Crankshaft position sensor power supply	—	[Ignition switch: ON]	5.0 V
23 (V)	9 (V)	EGR volume control valve position sensor power supply	—	[Ignition switch: ON]	5.0 V
25 (B)	114 (B)	Fuel injector power supply (Cylinder No. 3)	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0425ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0426ZZ

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< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

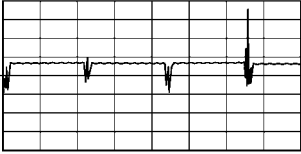
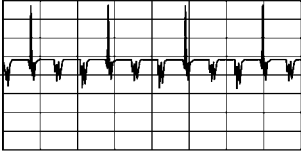
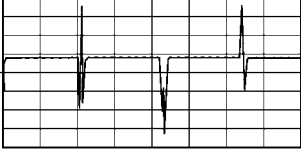
Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
26 (W)	114 (B)	Fuel injector (Cylinder No. 3)	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0427ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0428ZZ
31 (Y)	7 (B)	Fuel pump temperature sensor	Input	[Engine is running]	0 - 4.8 V Voltage varies with fuel temperature
33 (GR)	9 (V)	EGR volume control valve position sensor	Input	[Ignition switch: OFF] • Warm-up condition • For a few seconds after turning ignition switch OFF.	Voltage should fluctuates between 0.5 and 2.5 V, then drop to 0 V.
34 (SB)	10 (B)	ASCD steering switch	Input	[Ignition switch ON] • ASCD steering switch: All OFF	4.0 V
				[Ignition switch ON] • RESUME/ACCELERATE switch: Pressed	3.0 V
				[Ignition switch ON] • SET/COAST switch: Pressed	2.0 V
				[Ignition switch ON] • CANCEL switch: Pressed	1.0 V
				[Ignition switch: ON] • ASCD MAIN switch: OFF	0 V
36 (R)	12 (BR)	Throttle position sensor	Input	[Ignition switch ON]	3.35 – 4.55 V
37 (W)	13 (BR)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates)	1.0 – 4.0 V
38 (W)	14 (O)	Intake air temperature sensor 1	Input	[Engine is running] • Warm-up condition	0 – 4.8 V Voltage varies with intake air temperature
39 (SB)	15 (LG)	Engine coolant temperature sensor	Input	[Engine is running] • Warm-up condition	0 – 5.0 V Voltage varies with engine coolant temperature
40 (B)	16 (W)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	1.3 – 1.7 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.7 – 2.0 V

Terminal No.		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
42 (R)	18 (B)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 4.7 V ★
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 4.7 V ★
43 (R)	19 (B)	Crankshaft position sensor	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 3.5 V ★
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 3.5 V ★
44 (V)	12 (BR)	Throttle position sensor power supply	—	[Ignition switch: ON]	5.0 V
45 (W)	18 (B)	Camshaft position sensor power supply	—	[Ignition switch: ON]	5.0 V
46 (R)	16 (W)	Fuel rail pressure sensor power supply	—	[Ignition switch: ON]	5.0 V
48 (V)	55 (L)	Turbocharger boost sensor power supply	—	[Ignition switch: ON]	5.0 V

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< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
49 (B)	114 (B)	Fuel injector power supply (Cylinder No. 4)	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0425ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0426ZZ
51 (W)	114 (B)	Fuel injector (Cylinder No. 4)	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0427ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0428ZZ
54 (B)	—	Exhaust gas pressure sensor 1 ground	—	—	—
55 (L)	—	Turbocharger boost sensor ground	—	—	—
58 (B)	—	Intake air temperature sensor 2 ground	—	—	—
60 (W)	54 (B)	Exhaust gas pressure sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	1.0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.1 V
61 (BR)	55 (L)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	1.8 - 2.1 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.0 - 2.3 V

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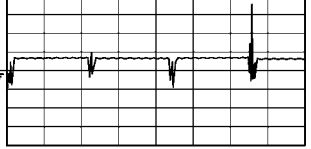
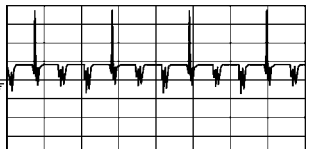
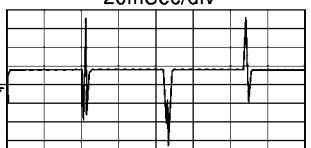
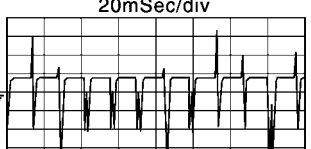
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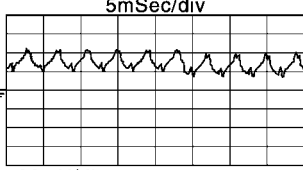
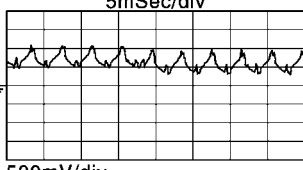
[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
71 (BR)	114 (B)	EGR cooler bypass valve control solenoid valve	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Engine coolant temperature: More than 45°C (113°F) • Engine speed: 2,200 rpm	0 V
73 (B)	114 (B)	Fuel injector power supply (Cylinder No. 1)	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0425ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0426ZZ
74 (W)	114 (B)	Fuel injector (Cylinder No. 1)	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed NOTE: The pulse cycle changes depending on rpm at idle	Approximately 7.5 V ★ 20mSec/div  10.0V/div JSBIA0427ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 8.0 V ★ 20mSec/div  10.0V/div JSBIA0428ZZ
80 (W)	114 (B)	ASCD brake switch (A/T) ASCD brake switch and ASCD clutch switch (M/T)	Input	[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Clutch pedal and brake pedal: Slightly depressed (M/T)	0 V
83 (Y)	114 (B)	Heat up switch	Input	[Ignition switch: ON] • Heat up switch: OFF	0 V
				[Ignition switch: ON] • Heat up switch: ON	BATTERY VOLTAGE (11 - 14 V)
97 (B)	—	ECM ground	—	—	—

ECM

< ECU DIAGNOSIS INFORMATION >

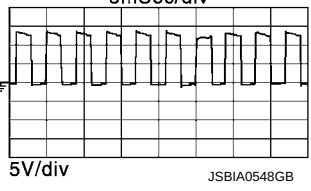
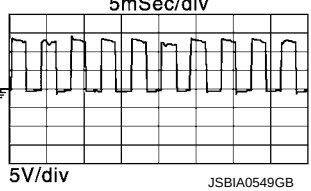
[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)	
+	-	Signal name	Input/Output			
98 (B)	—	ECM ground	—	—	—	A
99 (B)	—	ECM ground	—	—	—	EC
100 (B)	—	ECM ground	—	—	—	C
101 (R)	114 (B)	Power supply 1 for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	D
102 (G)	114 (B)	Power supply 2 for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	E
103 (B)	114 (B)	Fuel pump	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	Approximately 0.3 V ★  500mV/div JPBIA3296ZZ	F
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 0.3 V ★  500mV/div JPBIA3297ZZ	G
104 (V)	111 (W)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged*1 • Engine speed: Idle speed	2.6 - 3.5 V	H
105 (SB)	111 (W)	Battery current sensor power supply	—	[Ignition switch: ON]	5.0 V	I
106 (W)	108 (B)	Accelerator pedal position sensor 1 power supply	—	[Ignition switch: ON]	5.0 V	J
107 (R)	108 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.65 - 0.87 V	K
				[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	More than 4.3 V	L
108 (B)	—	Accelerator pedal position sensor 1 ground	—	—	—	M
111 (W)	—	Battery current sensor ground	—	—	—	N
112 (B)	—	Mass air flow sensor ground	—	—	—	O
114 (B)	—	ECM ground	—	—	—	P

ECM

< ECU DIAGNOSIS INFORMATION >

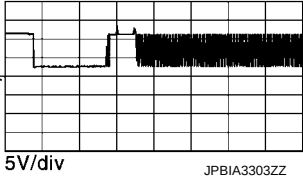
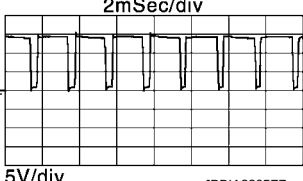
[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
116 (G)	114 (B)	Fuel pump	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed	Approximately 5.8 V ★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 5.5 V ★ 
117 (G)	114 (B)	Battery temperature sensor	Input	[Engine is running]	0 - 4.8 V Voltage varies with Battery temperature
119 (W)	121 (B)	Accelerator pedal position sensor 2 power supply	—	[Ignition switch: ON]	5.0 V
120 (R)	121 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.28 - 0.48 V
				[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	More than 2.0 V
121 (B)	—	Accelerator pedal position sensor 2 ground	—	—	—
125 (W)	112 (B)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Engine speed: Idle speed	0.8 – 1.3 V
				[Engine is running] • Warm-up condition • Engine speed: Idle to 4,000 rpm	0.8 - 1.3 V to Approximately 4.0 V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
127 (—)	—	Sensor ground 2 (Sensor shield circuit)	—	—	—
129 (BR)	114 (B)	ECM relay (self shut-off)	Output	For a few seconds after turning ignition switch OFF	0 – 1.0 V
				More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
130 (BR)	114 (B)	ECM relay (self shut-off)	Output	For a few seconds after turning ignition switch OFF	0 – 1.0 V
				More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
131 (GR)	114 (B)	Glow control	Output	[Ignition switch: ON] • Engine coolant temperature: Less than 55 °C (131 °F) • For a few seconds after turning ignition switch ON.	Approximately 7.0 V ★ 
134 (L)	—	Engine communication line (Turbocharger actuator)	Input/ Output	—	—
135 (P)	—	Engine communication line (Turbocharger actuator)	Input/ Output	—	—
136 (V)	114 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
137 (G)	—	Glow control	Input	—	—
140 (GR)	114 (B)	Throttle control motor (Open)	Output	[Engine is running] • Warm-up condition • Engine speed: Idle speed	BATTERY VOLTAGE (11 - 14 V) 
141 (Y)	114 (B)	EGR volume control valve (Close)	Output	[Ignition switch: OFF] • For a few seconds after turning ignition switch OFF.	1.0 - 2.0 V ★ ↑↓ (Periodically changes) BATTERY VOLTAGE (11 - 14V) 
142 (V)	114 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
143 (R)	114 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
145 (W)	58 (B)	Intake air temperature sensor 2	Input	[Engine is running] • Warm-up condition	0 - 4.8 V Voltage varies with intake air temperature
146 (SB)	114 (B)	Data link connector	Input/ Output	—	—
147 (L)	—	CAN communication line	Input/ Output	—	—
148 (P)	—	CAN communication line	Input/ Output	—	—

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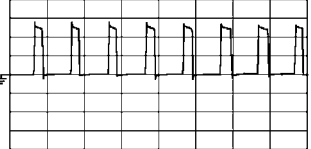
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< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
150 (V)	114 (B)	Start signal	Input	[Ignition switch: ON]	0 V
				[Ignition switch: START]	BATTERY VOLTAGE (11 - 14 V)
151 (G:A /T) (O: M/T)	114 (B)	Park/Neutral position switch	Input	[Ignition switch: ON] • Selector lever: P or N (A/T), Neutral (M/ T)	0 V
				[Ignition switch: ON] • Selector lever: Except the above posi- tion	BATTERY VOLTAGE (11 - 14 V)
153 (G)	114 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine: Stopped • Selector lever: D (A/T), 1st (M/T)	0 V
154 (O)	114 (B)	EGR volume control valve (Open)	Output	[Ignition switch: OFF] • Warm-up condition • For a few seconds after turning ignition switch OFF.	1.0 - 2.0 V ↑↓ (Periodically changes) BATTERY VOLTAGE (11 - 14V)  JP BIA3306ZZ

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: Before measuring the terminal voltage, confirm that the battery is fully charged.

Fail safe

INFOID:000000006106733

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode
U1025	ENG communication circuit	ECM limits the amount control of fuel injected.
P0088 P1272	Fuel rail pressure control	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0089 P0628 P0629 P1275	Fuel pump	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0093	Fuel system leak	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0122 P0123 P0222 P0223 P2135	Accelerator pedal position sen- sor	ECM recognizes the accelerator pedal position for 10% and controls fuel injected.
P0192 P0193	Fuel rail pressure control	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit). - ECM limits fuel rail pressure control (lower limit).
P0200	Fuel injector power supply cir- cuit	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit). - ECM limits fuel rail pressure control (lower limit). - ECM limits the fuel injected pattern.

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0201 P0202 P0203 P0204 P1268 P1269 P1270 P1271 P2147 P2148	Fuel injector	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P2146 P2149	Fuel injector power supply circuit	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0335 P0336	Crankshaft position sensor circuit	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0340 P0341	Camshaft position sensor circuit	ECM limits the amount control of fuel injected.
P0605	ECM	- ECM recognizes the accelerator pedal position for 10% and controls fuel injected. - ECM limits fuel rail pressure control (upper limit).
P0606 P2150 P2151	ECM	- ECM limits the amount control of fuel injected. - ECM limits fuel rail pressure control (upper limit).
P1020 P1021 P1022 P1023 P1024 P1025 P1026 P1029	TC control actuator	ECM limits the amount control of fuel injected.
P1028 P102B	Exhaust gas pressure sensor 1	ECM limits the amount control of fuel injected.
P102A	BARO sensor	ECM limits the amount control of fuel injected.
P1274	Fuel pump	ECM stops the engine promptly.
P1409	EGR	ECM shuts the EGR volume control valve.
P1550 P1551 P1552 P1553 P1554	Battery current sensor	ECM stops the power generation voltage variable control.
P1556 P1557	Battery temperature sensor	ECM stops the power generation voltage variable control.
P2478 or P247A	EGT sensor 1	ECM limits the amount control of fuel injected.

DTC Inspection Priority Chart

INFOID:000000006106734

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	DTC	Detected items
1	U1000	CAN communication line
	U1025	ENG communication line
	P0016	Crankshaft position - camshaft position correlation
	P0097, P0098	Intake air temperature sensor 2
	P0101, P0102, P0103	Mass air flow sensor
	P0112, P0113	Intake air temperature sensor
	P0117, P0118	Engine coolant temperature sensor
	P0122, P0123, P0222, P0223, P2135	Accelerator pedal position sensor
	P0182, P0183	Fuel pump temperature sensor
	P0192, P0193	Fuel rail pressure sensor
	P0237, P0238	Turbocharger boost sensor
	P0335, P0336	Crankshaft position sensor
	P0340, P0341	Camshaft position sensor
	P0405, P0406	EGR volume control valve position sensor
	P0472, P0473	Exhaust gas pressure sensor 1
	P0545, P0546, P247A	Exhaust gas temperature sensor 1
	P0563	Battery voltage
	P0605, P0606, P0607, P0668, P0669, P1616	ECM
	P0642, P0643, P0652, P0653	Sensor power supply
	P1550, P1551, P1552, P1553, P1554	Battery current sensor
	P1556, P1557	Battery temperature sensor
	P1610, P1611, P1612, P1613, P1614, P1615	NATS
	P1805	Brake switch
	P1622, P1623	Injector adjustment value
	P2150, P2151	COM2 power supply voltage
	P2228, P2229	Barometric pressure sensor
	P2621, P2622	Throttle position sensor

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Priority	DTC	Detected items
2	P0089, P0628, P0629, P1272, P1273, P1274, P1275	Fuel pump
	P0200, P0201, P0202, P0203, P0204, P1268, P1269, P1270, P1271, P2146, P2147, P2148, P2149	Fuel injector
	P0301, P0302, P0303, P0304	Misfire
	P0380, P0670	Glow control unit
	P0638	Electric throttle control actuator
	P0686	ECM relay
	P0700	Transmission cont
	P0705	T/M range sensor A
	P0710	Fluid temp sensor A
	P0717	Input speed sensor A
	P0720	Output speed sensor
	P0725	Engine speed
	P0731	1GR incorrect ratio
	P0732	2GR incorrect ratio
	P0733	3GR incorrect ratio
	P0734	4GR incorrect ratio
	P0735	5GR incorrect ratio
	P0740, P0744	Torque converter
	P0745	PC solenoid A
	P1020, P1021, P1022, P1023, P1024, P1025, P1026	TC boost control actuator
	P1212	TCS communication line
	P1409	EGR cooler bypass valve
	P1705	TP sensor
	P1730	Interlock
	P1752	Input clutch sol
	P1757	FR brake solenoid
	P1762	Drct clutch sol
	P1767	HLR clutch solenoid
	P1772	L C brake solenoid
	P1774	LC/B solenoid fnct
	P1805	Brake switch
	P2118	Throttle control motor
	P2119	Throttle control actuator
	P2426, P2427	EGR cooler bypass valve control solenoid valve

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Priority	DTC	Detected items
3	P0088, P0093	Fuel system
	P0217	Engine over temperature (OVERHEAT)
	P0234	Turbocharger system
	P0403, P0409	EGR volume control valve
	P0488	EGR driving
	P0501, P0502, P0503	ASCD vehicle speed sensor
	P0504	ASCD brake switch
	P0580, P0581	ASCD steering switch
	P1028, P102B	Exhaust gas pressure sensor 1
	P1029	TC boost sensor
	P102A	Barometric pressure sensor
	P1211	TCS control unit
	P2478 or P247A	Exhaust gas temperature sensor 1

DTC Index

INFOID:000000006106735

NOTE:

Check the EURO-OBD discrimination of the vehicle to confirm this information. Refer to [GI-48, "Identification Number"](#).

WITH EURO-OBD

×:Applicable —: Not applicable

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
U1000	1000*4	CAN COMM CIRCUIT	3	—	EC-1048, "DTC Logic"
U1025	1025	TC BOOST COMM LINE	3	—	EC-1049, "DTC Logic"
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing	—
P0016	0016	CMP/CKP RELATION	3	—	EC-1052, "DTC Logic"
P0088	0088	HIGH FUEL PRES	3	×	EC-1055, "DTC Logic"
P0089	0089	FUEL PUMP	3	—	EC-1058, "DTC Logic"
P0093	0093	FUEL LEAK	3	×	EC-1061, "DTC Logic"
P0097	0097	IAT SENSOR 2 B1	3	—	EC-1065, "DTC Logic"
P0098	0098	IAT SENSOR 2 B1	3	—	
P0101	0101	MAF SENSOR	3	×	EC-1068, "DTC Logic"
P0102	0102	MAF SEN/CIRCUIT	3	—	EC-1072, "DTC Logic"
P0103	0103	MAF SEN/CIRCUIT	3	—	
P0112	0112	IAT SEN/CIRCUIT	3	—	EC-1075, "DTC Logic"
P0113	0113	IAT SEN/CIRCUIT	3	—	
P0117	0117	ECT SEN/CIRCUIT	3	—	EC-1077, "DTC Logic"
P0118	0118	ECT SEN/CIRCUIT	3	—	
P0122	0122	APP SEN 1/CIRCUIT	3	—	EC-1079, "DTC Logic"
P0123	0123	APP SEN 1/CIRCUIT	3	—	
P0182	0182	FUEL TEMP SEN/CIRC	3	—	EC-1081, "DTC Logic"
P0183	0183	FUEL TEMP SEN/CIRC	3	—	

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P0192	0192	FRP SEN/CIRC	3	—	EC-1083, "DTC Logic"
P0193	0193	FRP SEN/CIRC	3	—	
P0200	0200	INJECTOR	3	×	EC-1085, "DTC Logic"
P0201	0201	CYL1 INJECTOR	3	—	EC-1086, "DTC Logic"
P0202	0202	CYL2 INJECTOR	3	—	
P0203	0203	CYL3 INJECTOR	3	—	
P0204	0204	CYL4 INJECTOR	3	—	
P0217	0217	ENG OVER TEMP	1	×	EC-1087, "DTC Logic"
P0222	0222	APP SEN 2/CIRCUIT	3	—	EC-1089, "DTC Logic"
P0223	0223	APP SEN 2/CIRCUIT	3	—	
P0234	0234	TC SYSTEM	3	—	EC-1091, "DTC Logic"
P0237	0237	TC BOOST SEN/CIRC	3	—	EC-1093, "DTC Logic"
P0238	0238	TC BOOST SEN/CIRC	3	—	
P0301	0301	INJ/CIRC1	1	—	EC-1095, "DTC Logic"
P0302	0302	INJ/CIRC2	1	—	
P0303	0303	INJ/CIRC3	1	—	
P0304	0304	INJ/CIRC4	1	—	
P0335	0335	CKP SEN/CIRCUIT	3	×	EC-1097, "DTC Logic"
P0336	0336	CKP SENSOR	3	×	
P0340	0340	CMP SEN/CIRCUIT	3	×	EC-1099, "DTC Logic"
P0341	0341	CMP SENSOR	3	×	
P0380	0380	GLOWRELAY	3	—	EC-1102, "DTC Logic"
P0403	0403	EGR SYSTEM	3	—	EC-1104, "DTC Logic"
P0405	0405	EGR SENSOR	3	—	EC-1106, "DTC Logic"
P0406	0406	EGR SENSOR	3	—	
P0409	0409	EGR SYSTEM	2	—	EC-1108, "DTC Logic"
P0473	0473	EXH PRESSURE SEN A	3	—	EC-1110, "DTC Logic"
P0488	0488	EGR SYSTEM	3	—	EC-1113, "DTC Logic"
P0501	0501	VEHICLE SPEED	3	—	EC-1114, "DTC Logic"
P0502	0502	VEHICLE SPEED	3	—	
P0503	0503	VEHICLE SPEED	3	—	
P0504	0504	BRAKE SW/CIRCUIT	3	—	EC-1116, "DTC Logic"
P0545	0545	EGT SENSOR 1 B1	3	—	EC-1123, "DTC Logic"
P0546	0546	EGT SENSOR 1 B1	3	—	
P0563	0563	BATTERY VOLTAGE	3	—	EC-1126, "DTC Logic"
P0580	0580	STRG SW/CIRC	3	—	EC-1127, "DTC Logic"
P0581	0581	STRG SW/CIRC	3	—	
P0605	0605	ECM	3	—	EC-1130, "DTC Logic"
P0606	0606	ECM	3	×	
P0607	0607	ECM	3	—	EC-1131, "DTC Logic"
P0628	0628	FUEL PUMP/CIRC	3	×	EC-1132, "DTC Logic"
P0629	0629	FUEL PUMP/CIRC	3	×	

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< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P0638	0638	ETC ACTR	3	—	EC-1134, "DTC Logic"
P0642	0642	SENSOR PWR/CIRC1	3	—	EC-1135, "DTC Logic"
P0643	0643	SENSOR PWR/CIRC1	3	—	
P0652	0652	SENSOR PWR/CIRC2	3	—	EC-1137, "DTC Logic"
P0653	0653	SENSOR PWR/CIRC2	3	—	
P0668	0668	ECM	3	—	EC-1139, "DTC Logic"
P0669	0669	ECM	3	—	
P0670	0670	GLOW PLUG CONT MDL	3	—	EC-1102, "DTC Logic"
P0686	0686	ECM RELAY	3	—	EC-1140, "DTC Logic"
P0700*5	0700	TRANSMISSION CONT	3	×	AT-116, "On Board Di-agnosis Logic"
P0705*5	0705	T/M RANGE SENSOR A	3	×	AT-117, "On Board Di-agnosis Logic"
P0717*5	0717	INPUT SPEED SENSOR A	3	×	AT-121, "On Board Di-agnosis Logic"
P0720*5	0720	OUTPUT SPEED SENSOR	3	×	AT-123, "On Board Di-agnosis Logic"
P0725*5	0725	ENGINE SPEED	3	×	AT-128, "On Board Di-agnosis Logic"
P0731*5	0731	1GR INCORRECT RATIO	3	×	AT-130, "On Board Di-agnosis Logic"
P0732*5	0732	2GR INCORRECT RATIO	3	×	AT-133, "On Board Di-agnosis Logic"
P0733*5	0733	3GR INCORRECT RATIO	3	×	AT-136, "On Board Di-agnosis Logic"
P0734*5	0734	4GR INCORRECT RATIO	3	×	AT-139, "On Board Di-agnosis Logic"
P0735*5	0735	5GR INCORRECT RATIO	3	×	AT-142, "On Board Di-agnosis Logic"
P0740*5	0740	TORQUE CONVERTER	3	×	AT-145, "On Board Di-agnosis Logic"
P0744*5	0744	TORQUE CONVERTER	3	×	AT-147, "On Board Di-agnosis Logic"
P0745*5	0745	PC SOLENOID A	3	×	AT-149, "On Board Di-agnosis Logic"
P1020	1020	TC BOOST CONT ACT	3	—	EC-1142, "DTC Logic"
P1021	1021	TC BOOST CONT ACT	3	—	
P1022	1022	TC BOOST CONT ACT	3	—	
P1023	1023	TC BOOST CONT ACT	3	—	
P1024	1024	TC BOOST CONT ACT	3	—	
P1025	1025	TC BOOST CONT ACT	3	—	
P1026	1026	TC BOOST CONT ACT	3	—	
P1028	1028	EXH PRESSURE SEN A	3	—	EC-1143, "DTC Logic"
P1029	1029	TC BOOST SENSOR A	3	—	EC-1144, "DTC Logic"
P102A	102A	BARO SENSOR A	3	—	EC-1145, "DTC Logic"
P102B	102B	EXHAUST GAS SYSTEM	3	—	EC-1146, "DTC Logic"
P1211	1211	TCS C/U FUNCTN	3	—	EC-1147, "DTC Logic"

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P1212	1212	TCS/CIRC	3	—	EC-1148, "DTC Logic"
P1268	1268	INJECTOR 1	3	—	EC-1149, "DTC Logic"
P1269	1269	INJECTOR 2	3	—	
P1270	1270	INJECTOR 3	3	—	
P1271	1271	INJECTOR 4	3	—	
P1272	1272	FRP RELIEF VALVE	3	—	EC-1152, "DTC Logic"
P1273	1273	FUEL PUMP	3	×	EC-1156, "DTC Logic"
P1274	1274	FUEL PUMP	1	—	EC-1159, "DTC Logic"
P1275	1275	FUEL PUMP	1	×	EC-1161, "DTC Logic"
P1409	1409	EGR COOLING BYPASS/V	1	—	EC-1163, "DTC Logic"
P1550	1550	BAT CURRENT SENSOR	3	—	EC-1165, "DTC Logic"
P1551	1551	BAT CURRENT SENSOR	3	—	
P1552	1552	BAT CURRENT SENSOR	3	—	
P1553	1553	BAT CURRENT SENSOR	3	—	
P1554	1554	BAT CURRENT SENSOR	3	—	EC-1169, "DTC Logic"
P1556	1556	BAT TMP SEN/CIRC	3	—	
P1557	1557	BAT TMP SEN/CIRC	3	—	
P1610	1610	LOCK MODE	3	—	BL-74, "CONSULT Function"
P1611	1611	ID DISCORD,IMMU-ECM	3	—	
P1612	1612	CHAIN OF ECM-IMMU	3	—	
P1614	1614	CHAIN OF IMMU-KEY	3	—	
P1615	1615	DIFFERENCE OF KEY	3	—	
P1616	1616	ECM C/U	3	—	
P1622	1622	INJ ADJ VAL UNRGST	3	—	EC-1172, "DTC Logic"
P1623	1623	INJ ADJ VAL ERROR	3	—	EC-1173, "DTC Logic"
P1705*5	1705	TP SENSOR	3	×	AT-151, "On Board Di- agnosis Logic"
P1730*5	1730	INTERLOCK	3	×	AT-159, "On Board Di- agnosis Logic"
P1752*5	1752	INPUT CLUTCH SOL	3	×	AT-163, "On Board Di- agnosis Logic"
P1757*5	1757	FR BRAKE SOLENOID	3	×	AT-165, "On Board Di- agnosis Logic"
P1762*5	1762	DRCT CLUTCH SOL	3	×	AT-167, "On Board Di- agnosis Logic"
P1767*5	1767	HLR CLUTCH SOLENOID	3	×	AT-169, "On Board Di- agnosis Logic"
P1772*5	1772	L C BRAKE SOLENOID	3	×	AT-171, "On Board Di- agnosis Logic"
P1774*5	1774	LC/B SOLENOID FNCT	3	×	AT-173, "On Board Di- agnosis Logic"
P1805	1805	BRAKE SWITCH	1	×	EC-1175, "DTC Logic"
P2118	2118	ETC MOT	3	×	EC-1178, "DTC Logic"
P2119	2119	ETC ACTR	3	—	EC-1180, "DTC Logic"
P2135	2135	APP SENSOR	3	—	EC-1181, "DTC Logic"

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P2146	2146	INJ PWR/CIRC	3	×	EC-1183, "DTC Logic"
P2147	2147	INJECTOR/CIRC	3	×	EC-1184, "DTC Logic"
P2148	2148	INJECTOR/CIRC	3	×	
P2149	2149	INJ PWR/CIRC	3	×	EC-1183, "DTC Logic"
P2150	2150	FUEL INJ GROUP B	3	×	EC-1185, "DTC Logic"
P2151	2151	FUEL INJ GROUP B	3	×	
P2228	2228	BARO SEN/CIRC	3	—	EC-1186, "DTC Logic"
P2229	2229	BARO SEN/CIRC	3	—	
P2426	2426	EGR COOLING VALVE	3	×	EC-1187, "DTC Logic"
P2427	2427	EGR COOLING VALVE	3	—	
P2478*6	2478	EGT SENSOR	1	×	EC-1189, "DTC Logic"
P247A*7	247A	EGT SENSOR	1	×	EC-1190, "DTC Logic"
P2621	2621	TP SEN/CIRCUIT	3	×	EC-1191, "DTC Logic"
P2622	2622	TP SEN/CIRCUIT	3	×	

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT.

*5: Models with A/T model.

*6: VIN ≥ VSK***D40**393615

*7: VIN < VSK***D40**393615

WITHOUT EURO-OBd

×:Applicable —: Not applicable

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
U1000	1000*4	CAN COMM CIRCUIT	3	—	EC-1048, "DTC Logic"
U1025	1025	TC BOOST COMM LINE	3	—	EC-1049, "DTC Logic"
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing	—
P0016	0016	CMP/CKP RELATION	3	—	EC-1052, "DTC Logic"
P0088	0088	HIGH FUEL PRES	3	×	EC-1055, "DTC Logic"
P0089	0089	FUEL PUMP	3	—	EC-1058, "DTC Logic"
P0093	0093	FUEL LEAK	3	×	EC-1061, "DTC Logic"
P0097	0097	IAT SENSOR 2 B1	3	—	EC-1065, "DTC Logic"
P0098	0098	IAT SENSOR 2 B1	3	—	
P0102	0102	MAF SEN/CIRCUIT	3	—	EC-1072, "DTC Logic"
P0103	0103	MAF SEN/CIRCUIT	3	—	
P0112	0112	IAT SEN/CIRCUIT	3	—	EC-1075, "DTC Logic"
P0113	0113	IAT SEN/CIRCUIT	3	—	
P0117	0117	ECT SEN/CIRCUIT	3	—	EC-1077, "DTC Logic"
P0118	0118	ECT SEN/CIRCUIT	3	—	

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DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P0122	0122	APP SEN 1/CIRCUIT	3	—	EC-1079, "DTC Logic"
P0123	0123	APP SEN 1/CIRCUIT	3	—	
P0182	0182	FUEL TEMP SEN/CIRC	3	—	EC-1081, "DTC Logic"
P0183	0183	FUEL TEMP SEN/CIRC	3	—	
P0192	0192	FRP SEN/CIRC	3	—	EC-1083, "DTC Logic"
P0193	0193	FRP SEN/CIRC	3	—	
P0200	0200	INJECTOR	3	×	EC-1085, "DTC Logic"
P0201	0201	CYL1 INJECTOR	3	—	
P0202	0202	CYL2 INJECTOR	3	—	EC-1086, "DTC Logic"
P0203	0203	CYL3 INJECTOR	3	—	
P0204	0204	CYL4 INJECTOR	3	—	
P0217	0217	ENG OVER TEMP	1	×	EC-1087, "DTC Logic"
P0222	0222	APP SEN 2/CIRCUIT	3	—	EC-1089, "DTC Logic"
P0223	0223	APP SEN 2/CIRCUIT	3	—	
P0234	0234	TC SYSTEM	3	—	EC-1091, "DTC Logic"
P0237	0237	TC BOOST SEN/CIRC	3	—	EC-1093, "DTC Logic"
P0238	0238	TC BOOST SEN/CIRC	3	—	
P0301	0301	INJ/CIRC1	1	—	EC-1095, "DTC Logic"
P0302	0302	INJ/CIRC2	1	—	
P0303	0303	INJ/CIRC3	1	—	
P0304	0304	INJ/CIRC4	1	—	
P0335	0335	CKP SEN/CIRCUIT	3	×	EC-1097, "DTC Logic"
P0336	0336	CKP SENSOR	3	×	
P0340	0340	CMP SEN/CIRCUIT	3	×	EC-1099, "DTC Logic"
P0341	0341	CMP SENSOR	3	×	
P0380	0380	GLOWRELAY	3	—	EC-1102, "DTC Logic"
P0403	0403	EGR SYSTEM	3	—	EC-1104, "DTC Logic"
P0405	0405	EGR SENSOR	3	—	EC-1106, "DTC Logic"
P0406	0406	EGR SENSOR	3	—	
P0409	0409	EGR SYSTEM	2	—	EC-1108, "DTC Logic"
P0473	0473	EXH PRESSURE SEN A	3	—	EC-1110, "DTC Logic"
P0488	0488	EGR SYSTEM	3	—	EC-1113, "DTC Logic"
P0501	0501	VEHICLE SPEED	3	—	EC-1114, "DTC Logic"
P0502	0502	VEHICLE SPEED	3	—	
P0503	0503	VEHICLE SPEED	3	—	
P0504	0504	BRAKE SW/CIRCUIT	3	—	EC-1116, "DTC Logic"
P0545	0545	EGT SENSOR 1 B1	3	—	EC-1123, "DTC Logic"
P0546	0546	EGT SENSOR 1 B1	3	—	
P0563	0563	BATTERY VOLTAGE	3	—	EC-1126, "DTC Logic"
P0580	0580	STRG SW/CIRC	3	—	EC-1127, "DTC Logic"
P0581	0581	STRG SW/CIRC	3	—	

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DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P0605	0605	ECM	3	—	EC-1130, "DTC Logic"
P0606	0606	ECM	3	×	
P0607	0607	ECM	3	—	EC-1131, "DTC Logic"
P0628	0628	FUEL PUMP/CIRC	3	×	EC-1132, "DTC Logic"
P0629	0629	FUEL PUMP/CIRC	3	×	
P0638	0638	ETC ACTR	3	—	EC-1134, "DTC Logic"
P0642	0642	SENSOR PWR/CIRC1	3	—	EC-1135, "DTC Logic"
P0643	0643	SENSOR PWR/CIRC1	3	—	
P0652	0652	SENSOR PWR/CIRC2	3	—	EC-1137, "DTC Logic"
P0653	0653	SENSOR PWR/CIRC2	3	—	
P0668	0668	ECM	3	—	EC-1139, "DTC Logic"
P0669	0669	ECM	3	—	
P0670	0670	GLOW PLUG CONT MDL	3	—	EC-1102, "DTC Logic"
P0686	0686	ECM RELAY	3	—	EC-1140, "DTC Logic"
P1020	1020	TC BOOST CONT ACT	3	—	EC-1142, "DTC Logic"
P1021	1021	TC BOOST CONT ACT	3	—	
P1022	1022	TC BOOST CONT ACT	3	—	
P1023	1023	TC BOOST CONT ACT	3	—	
P1024	1024	TC BOOST CONT ACT	3	—	
P1025	1025	TC BOOST CONT ACT	3	—	
P1026	1026	TC BOOST CONT ACT	3	—	
P1028	1028	EXH PRESSURE SEN A	3	—	EC-1143, "DTC Logic"
P1029	1029	TC BOOST SENSOR A	3	—	EC-1144, "DTC Logic"
P102A	102A	BARO SENSOR A	3	—	EC-1145, "DTC Logic"
P102B	102B	EXHAUST GAS SYSTEM	3	—	EC-1146, "DTC Logic"
P1211	1211	TCS C/U FUNCTN	3	—	EC-1147, "DTC Logic"
P1212	1212	TCS/CIRC	3	—	EC-1148, "DTC Logic"
P1268	1268	INJECTOR 1	3	—	EC-1149, "DTC Logic"
P1269	1269	INJECTOR 2	3	—	
P1270	1270	INJECTOR 3	3	—	
P1271	1271	INJECTOR 4	3	—	
P1272	1272	FRP RELIEF VALVE	3	—	EC-1152, "DTC Logic"
P1273	1273	FUEL PUMP	3	×	EC-1156, "DTC Logic"
P1274	1274	FUEL PUMP	1	—	EC-1159, "DTC Logic"
P1275	1275	FUEL PUMP	1	×	EC-1161, "DTC Logic"
P1409	1409	EGR COOLING BYPASS/V	1	—	EC-1163, "DTC Logic"
P1550	1550	BAT CURRENT SENSOR	3	—	EC-1165, "DTC Logic"
P1551	1551	BAT CURRENT SENSOR	3	—	
P1552	1552	BAT CURRENT SENSOR	3	—	
P1553	1553	BAT CURRENT SENSOR	3	—	
P1554	1554	BAT CURRENT SENSOR	3	—	

DTC*1		Items (CONSULT screen terms)	Trip	MIL	Reference page
CONSULT GST*2	ECM*3				
P1556	1556	BAT TMP SEN/CIRC	3	—	EC-1169, "DTC Logic"
P1557	1557	BAT TMP SEN/CIRC	3	—	
P1610	1610	LOCK MODE	3	—	BL-74, "CONSULT Function"
P1611	1611	ID DISCORD,IMMU-ECM	3	—	
P1612	1612	CHAIN OF ECM-IMMU	3	—	
P1614	1614	CHAIN OF IMMU-KEY	3	—	
P1615	1615	DIFFERENCE OF KEY	3	—	
P1616	1616	ECM C/U	3	—	
P1622	1622	INJ ADJ VAL UNRGST	3	—	EC-1172, "DTC Logic"
P1623	1623	INJ ADJ VAL ERROR	3	—	EC-1173, "DTC Logic"
P1805	1805	BRAKE SWITCH	1	×	EC-1175, "DTC Logic"
P2118	2118	ETC MOT	3	×	EC-1178, "DTC Logic"
P2119	2119	ETC ACTR	3	—	EC-1180, "DTC Logic"
P2135	2135	APP SENSOR	3	—	EC-1181, "DTC Logic"
P2146	2146	INJ PWR/CIRC	3	×	EC-1183, "DTC Logic"
P2147	2147	INJECTOR/CIRC	3	×	EC-1184, "DTC Logic"
P2148	2148	INJECTOR/CIRC	3	×	
P2149	2149	INJ PWR/CIRC	3	×	EC-1183, "DTC Logic"
P2150	2150	FUEL INJ GROUP B	3	×	EC-1185, "DTC Logic"
P2151	2151	FUEL INJ GROUP B	3	×	
P2228	2228	BARO SEN/CIRC	3	—	EC-1186, "DTC Logic"
P2229	2229	BARO SEN/CIRC	3	—	
P2426	2426	EGR COOLING VALVE	3	—	EC-1187, "DTC Logic"
P2427	2427	EGR COOLING VALVE	3	—	
P2478*5	2478	EGT SENSOR	1	—	EC-1189, "DTC Logic"
P247A*6	247A	EGT SENSOR	1	—	EC-1190, "DTC Logic"
P2621	2621	TP SEN/CIRCUIT	3	×	EC-1191, "DTC Logic"
P2622	2622	TP SEN/CIRCUIT	3	×	

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT.

*5: VIN ≥ VSK***D40**393615

*6: VIN < VSK***D40**393615

Test Value and Test Limit

INFOID:000000006106736

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014C	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1
			P014D	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P014D	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1
			P015A	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
			P015A	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1
			P015B	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1
			P015B	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

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[YD25DDTi]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014E	8EH	04H	O2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 1
			P014F	8FH	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P014F	90H	84H	O2 Sensor Slow Response - Lean to Rich Bank 2 Sensor 1
			P015C	91H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015C	92H	01H	O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1
			P015D	93H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
			P015D	94H	01H	O2 Sensor Delayed Response - Lean to Rich Bank 2 Sensor 1
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
CATA- LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

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[YD25DDTi]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
Secondary Air	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

ECM

< ECU DIAGNOSIS INFORMATION >

[YD25DDTi]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

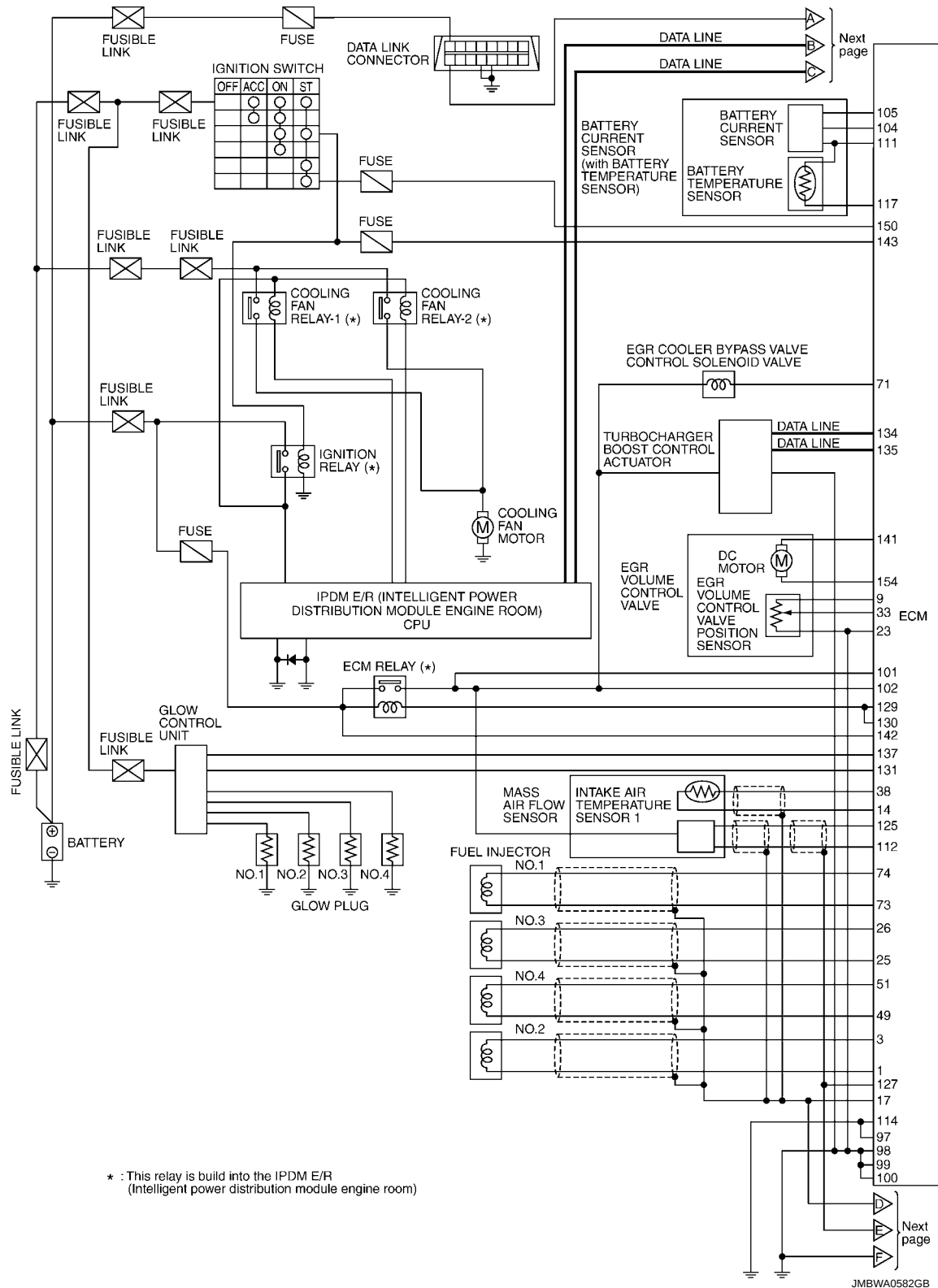
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

WIRING DIAGRAM

ENGINE CONTROL SYSTEM

Schematic

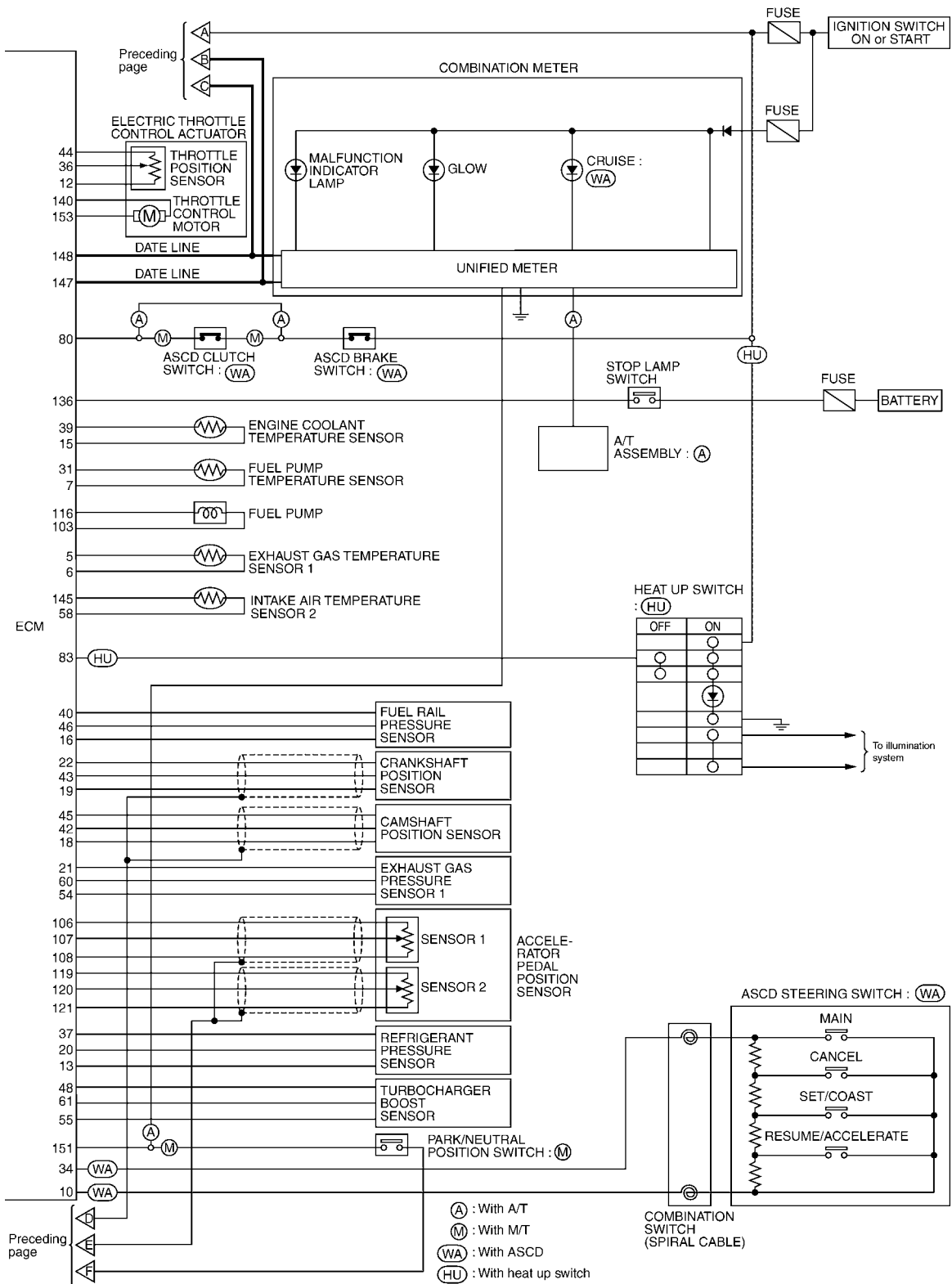
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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]



JMBWA0586GB

ENGINE CONTROL SYSTEM

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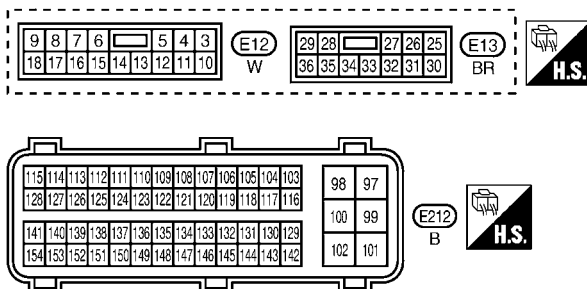
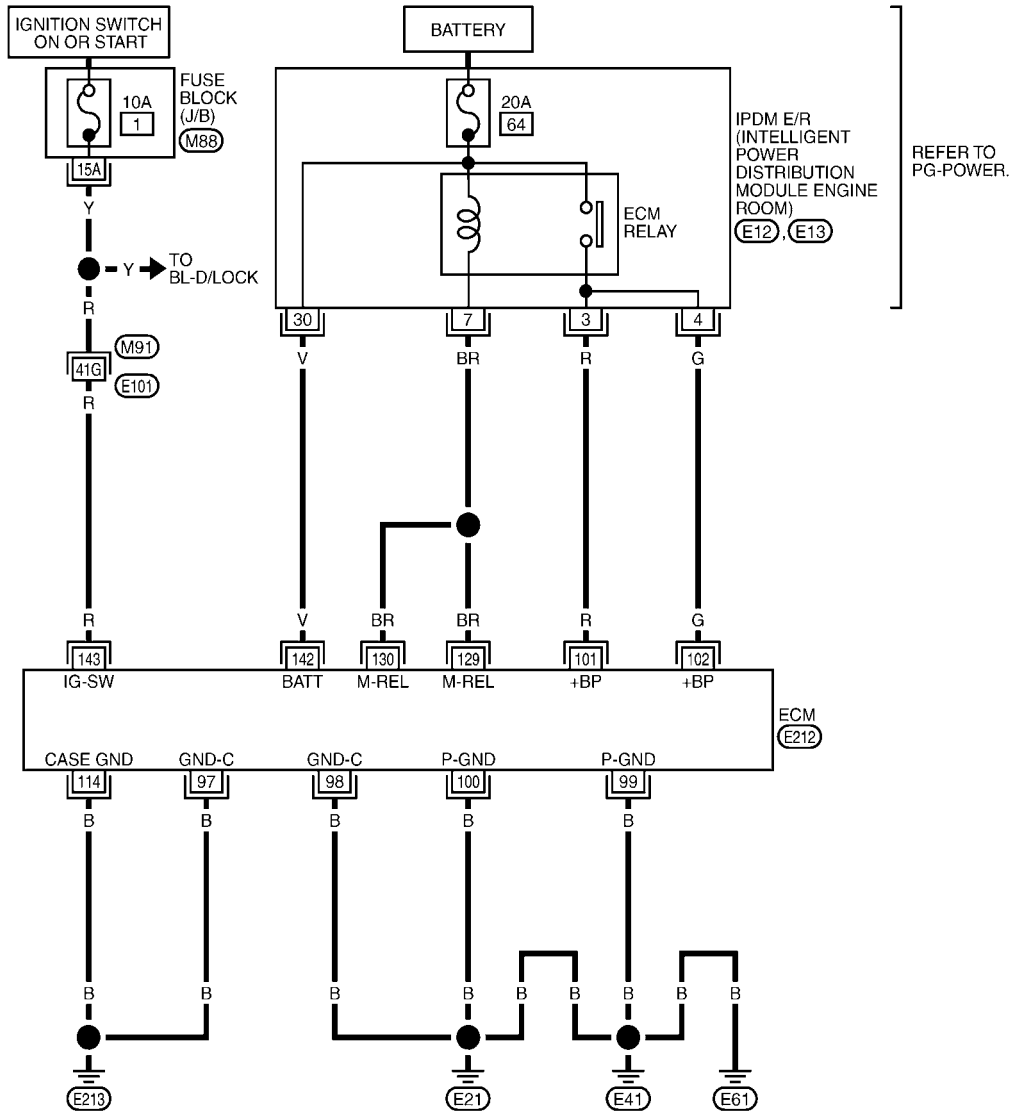
[YD25DDTi]

Wiring Diagram - MAIN -

INFOID:000000006106738

EC-MAIN-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

- (M88) - FUSE BLOCK - JUNCTION BOX (J/B)
- (M91) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0499GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

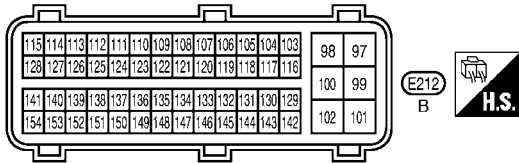
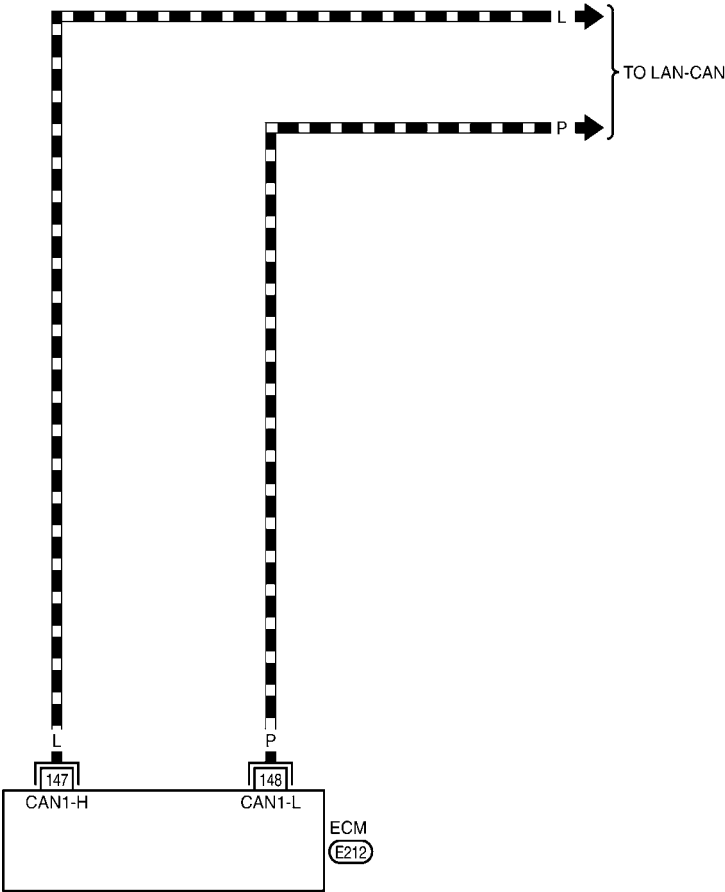
[YD25DDTi]

Wiring Diagram - CAN -

INFOID:000000006106739

EC-CAN-01

- DATA LINE
- DETECTABLE LINE FOR DTC
- NON-DETECTABLE LINE FOR DTC



JMBWA0364GB

ENGINE CONTROL SYSTEM

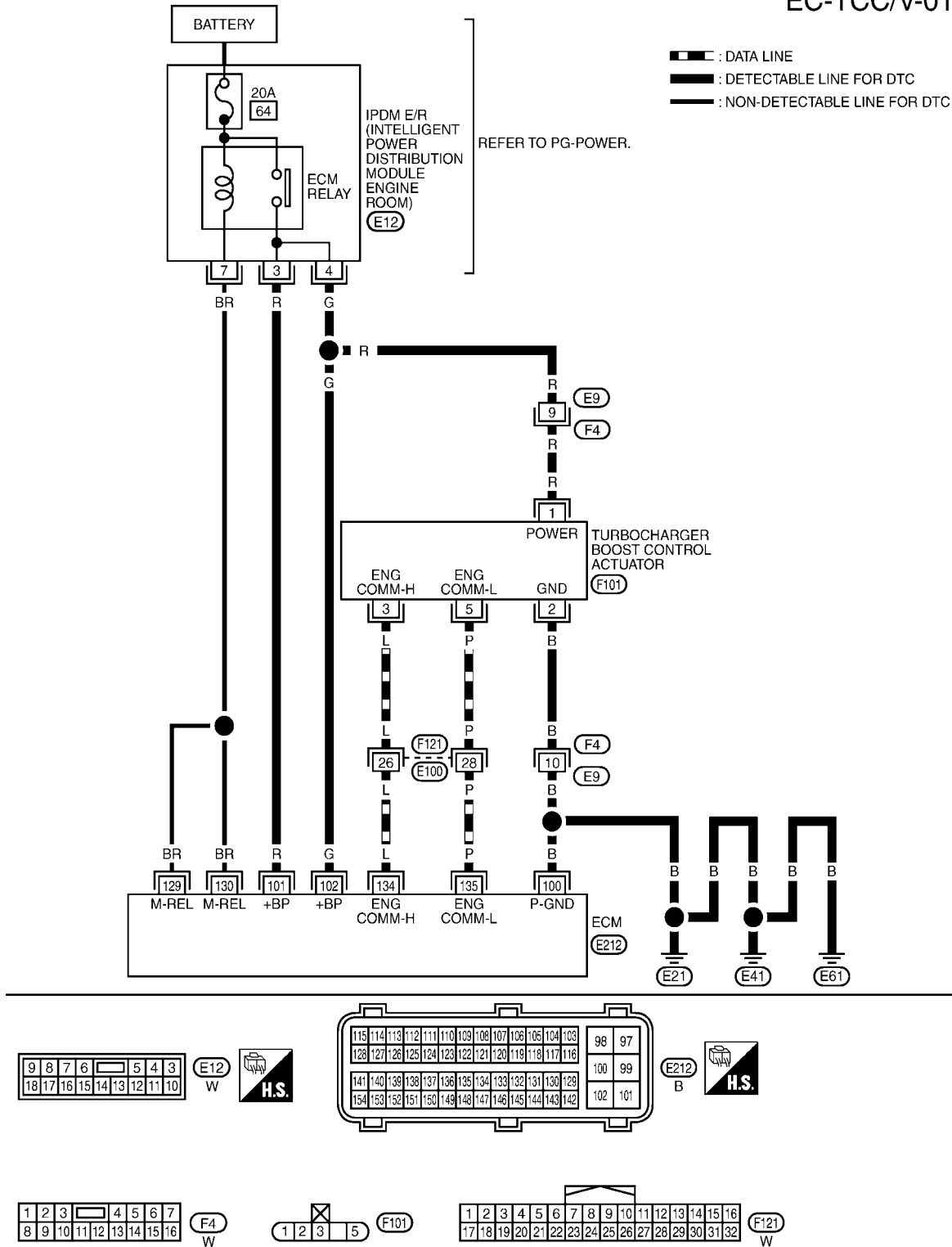
[YD25DDTi]

< WIRING DIAGRAM >

Wiring Diagram - TCC/V -

INFOID:000000006106740

EC-TCC/V-01



JMBWA0587GB

ENGINE CONTROL SYSTEM

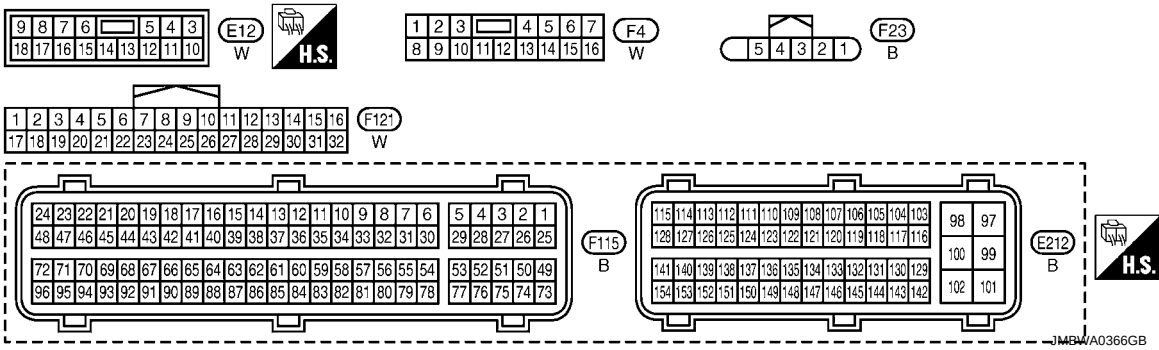
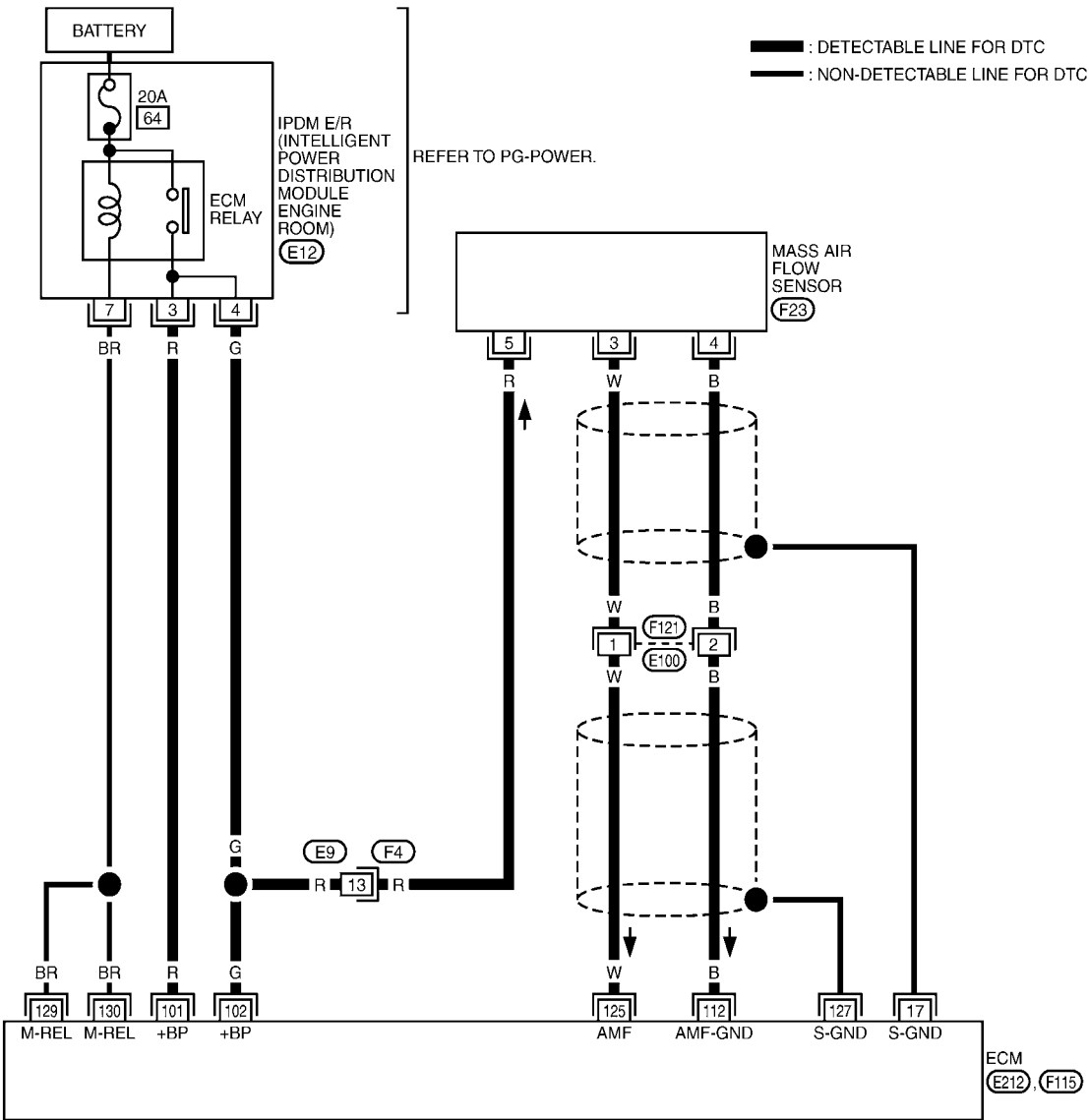
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[YD25DDTi]

Wiring Diagram - MAFS -

INFOID:000000006106741

EC-MAFS-01



ENGINE CONTROL SYSTEM

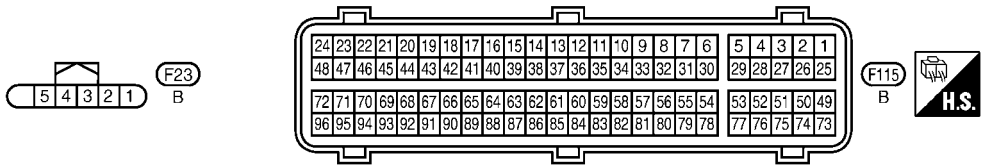
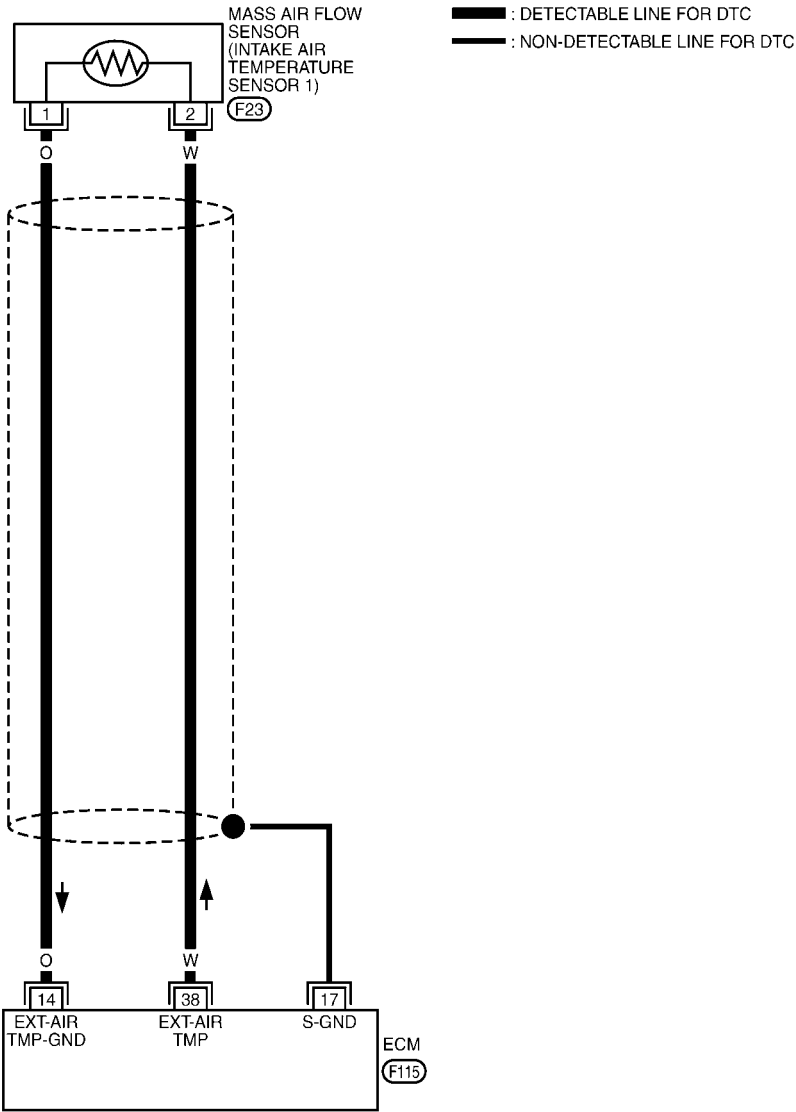
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[YD25DDTi]

Wiring Diagram - IATS -

INFOID:000000006106742

EC-IATS-01



JMBWA0367GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]

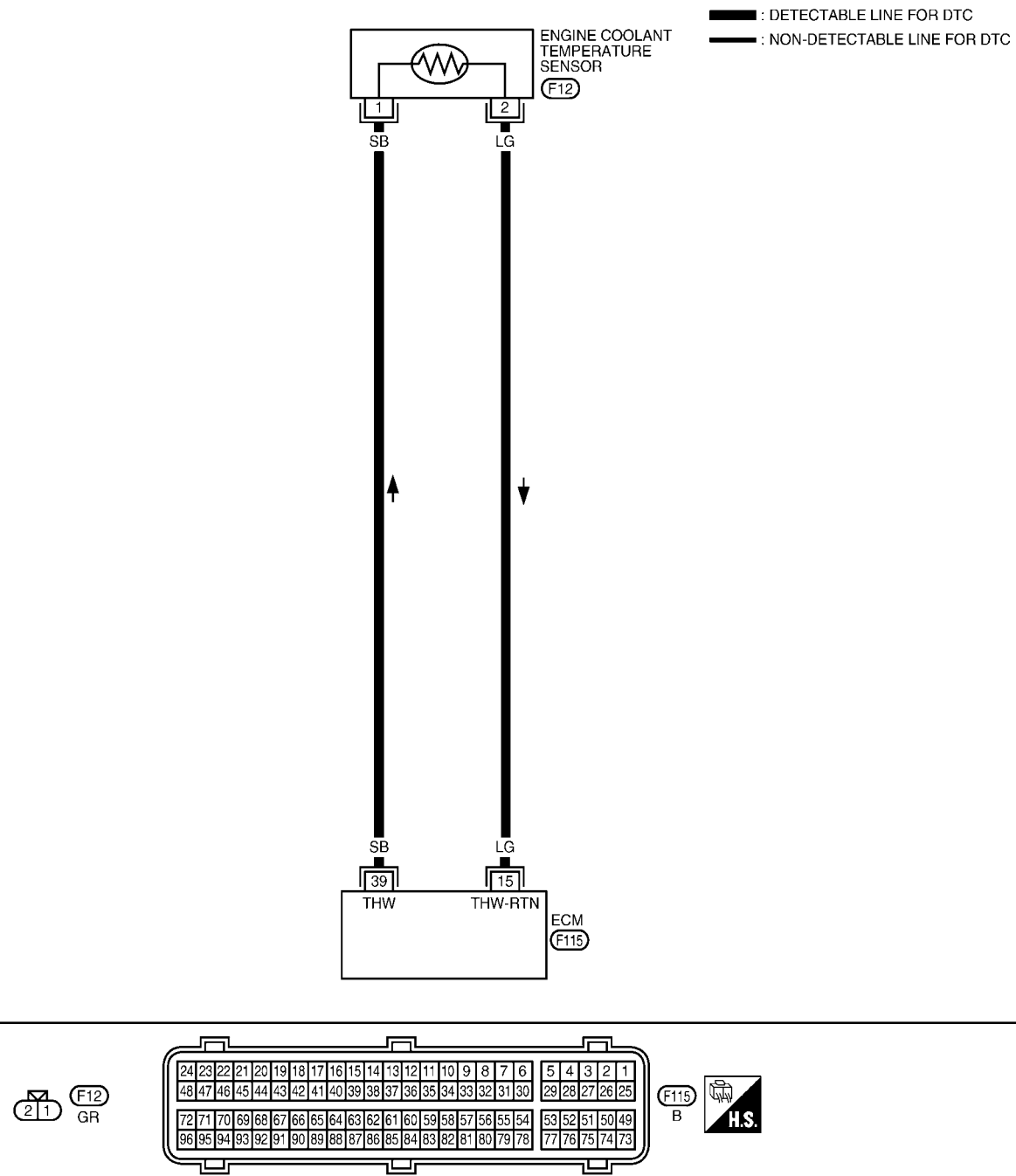
Wiring Diagram - ECTS -

INFOID:000000006106743

EC-ECTS-01

A
C
D
E
F
G
H
I
J
K
L
M
N
O
P

EC



JMBWA0368GB

ENGINE CONTROL SYSTEM

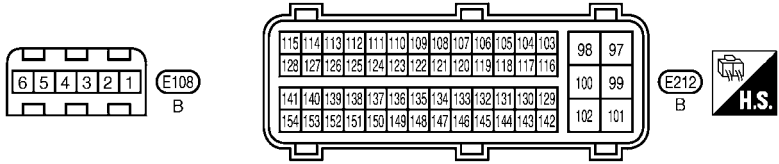
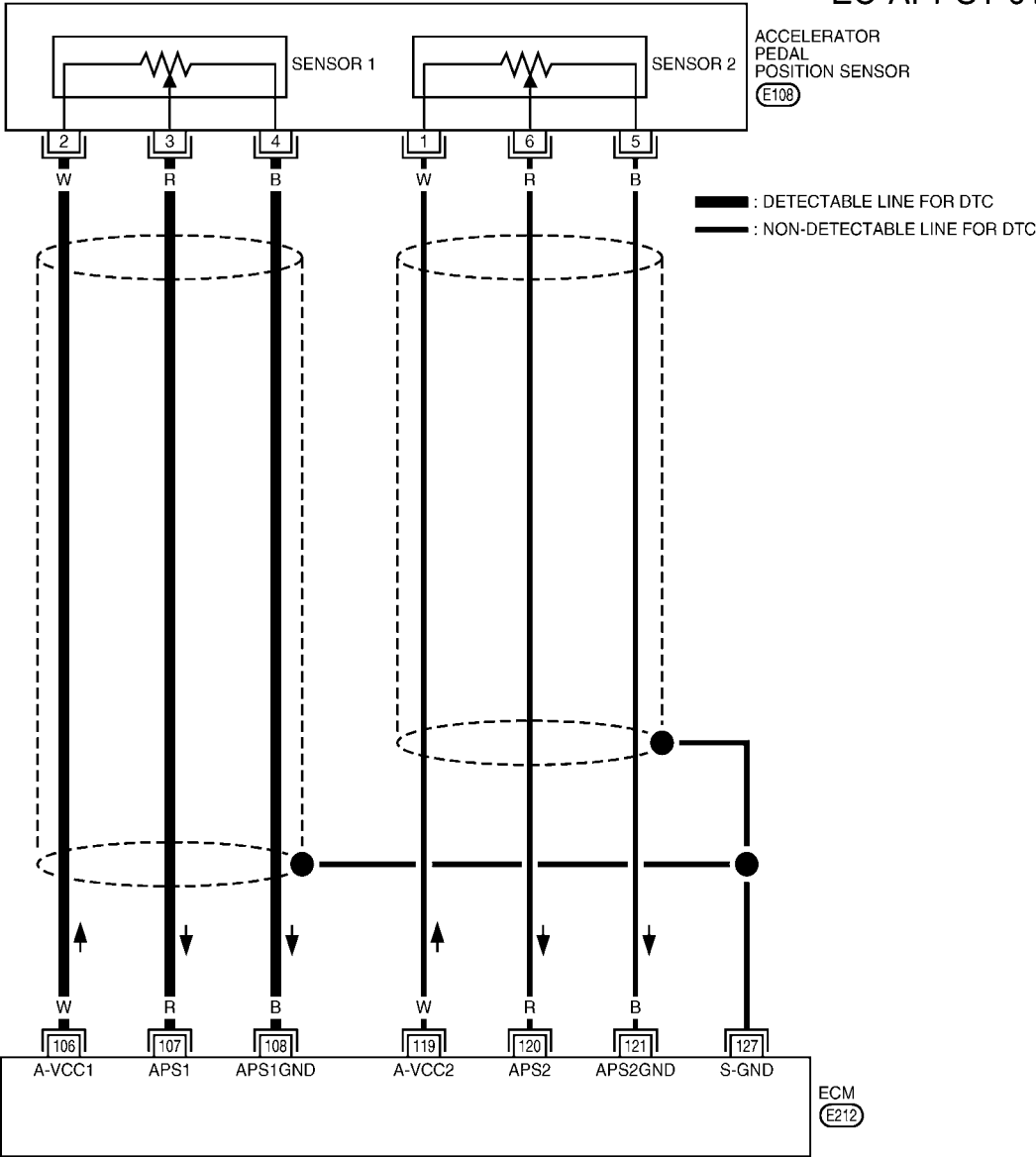
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[YD25DDTi]

Wiring Diagram - APPS1 -

INFOID:000000006106744

EC-APPS1-01



JMBWA0369GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]

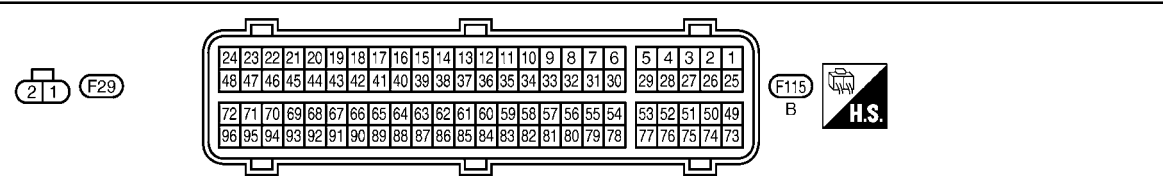
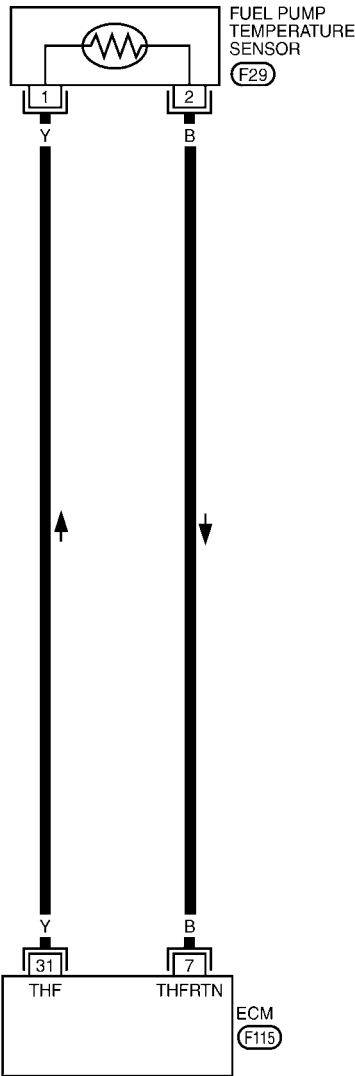
Wiring Diagram - FTS -

INFOID:000000006106745

EC-FTS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC

EC



JMBWA0372GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

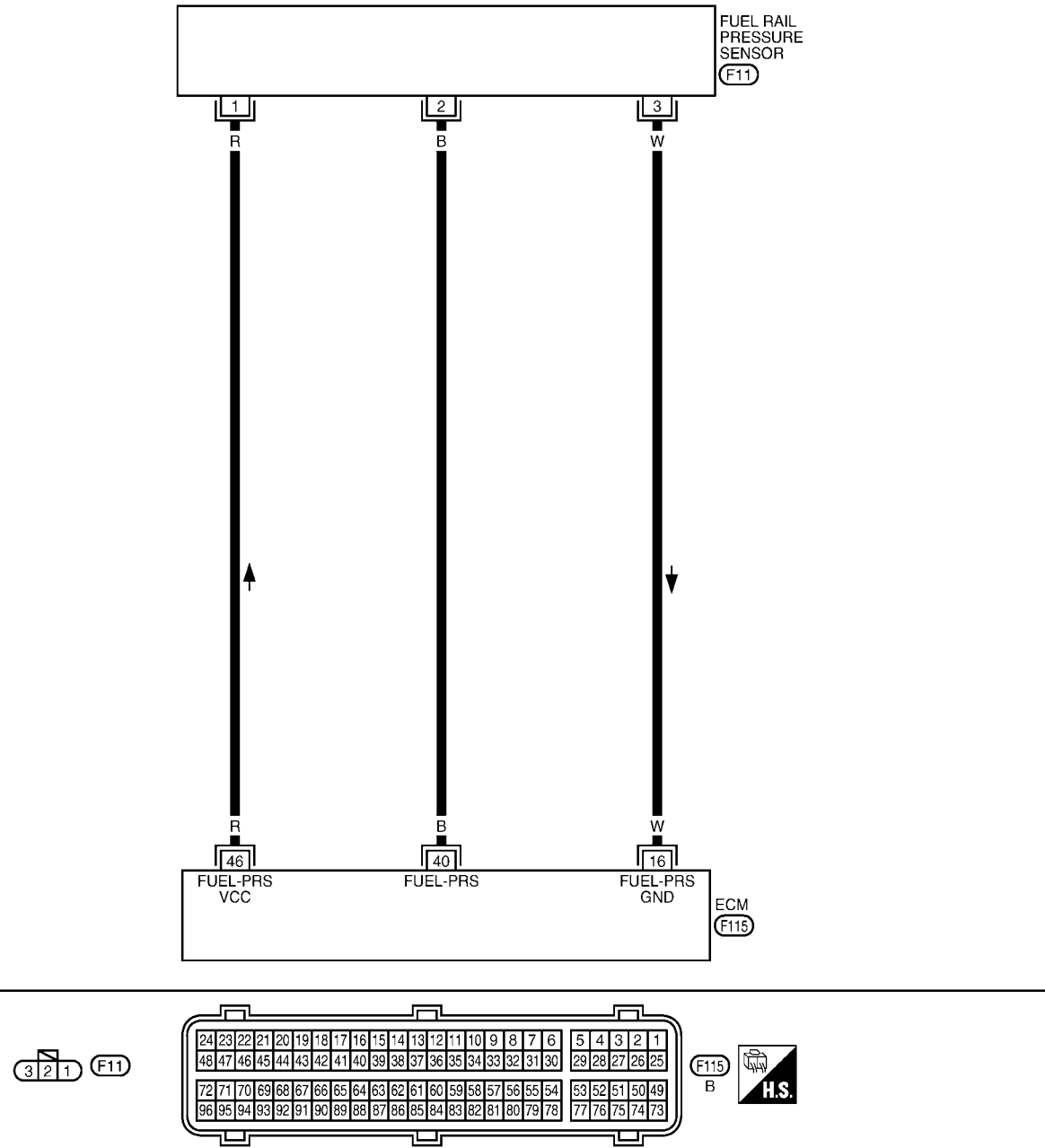
[YD25DDTi]

Wiring Diagram - FRPS -

INFOID:000000006106746

EC-FRPS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0373GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

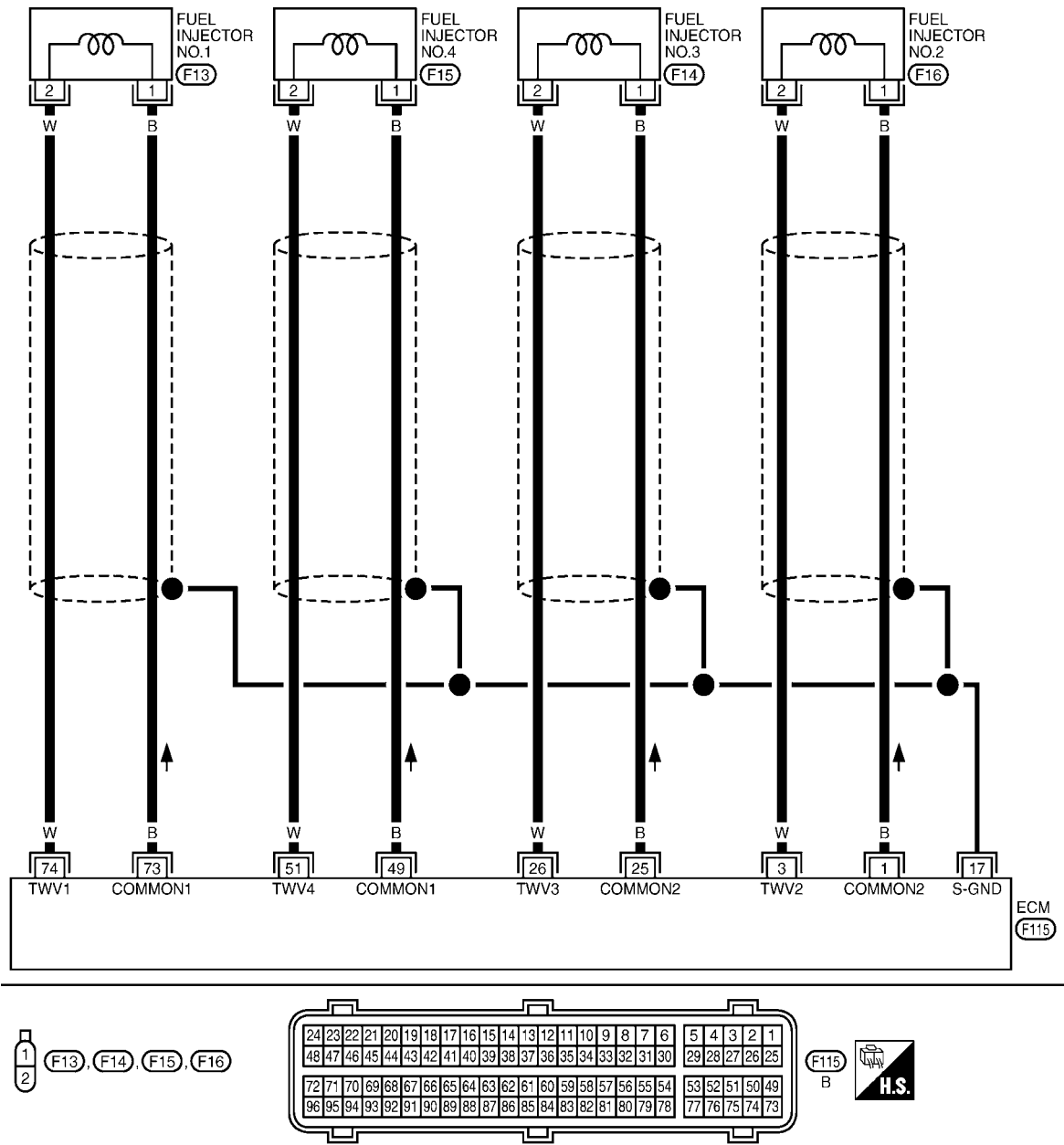
[YD25DDTi]

Wiring Diagram - INJECT -

INFOID:000000006106747

EC-INJECT-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0374GB

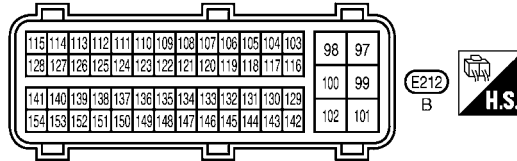
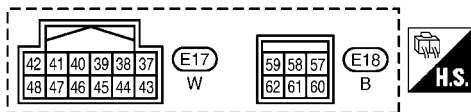
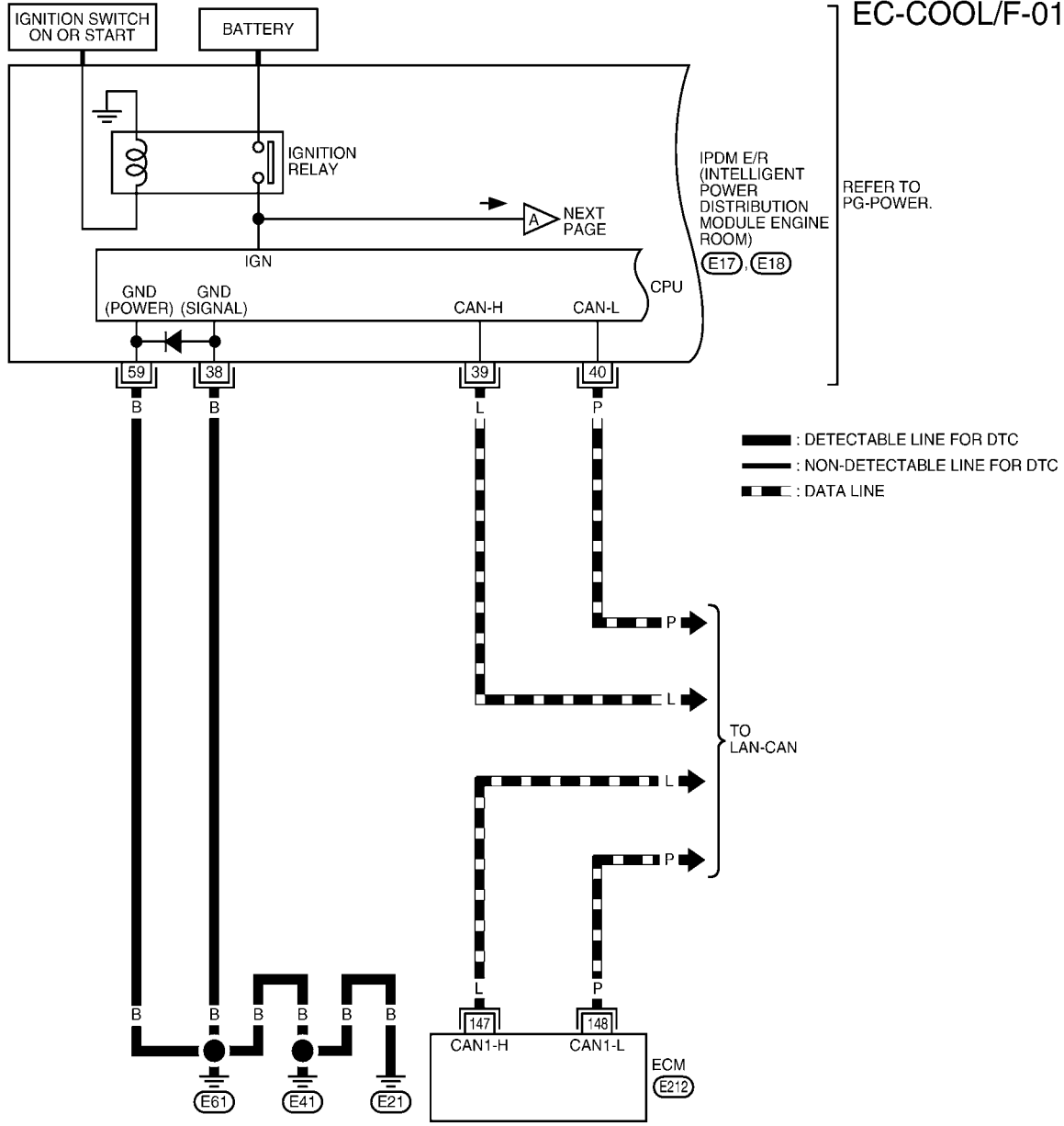
ENGINE CONTROL SYSTEM

[YD25DDTi]

INFOID:000000006106748

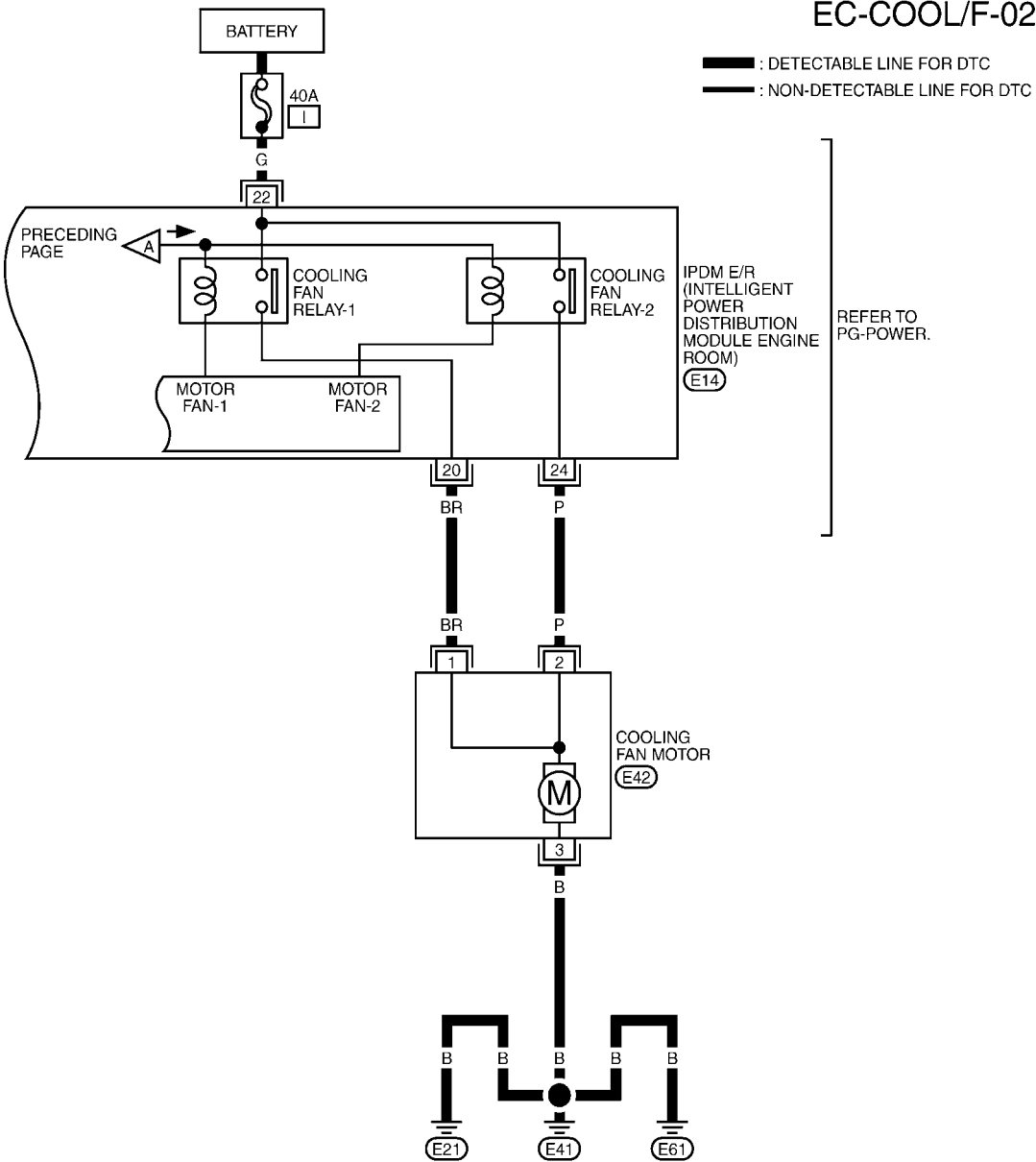
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Wiring Diagram - COOL/F -



JMBWA0375GB

EC-COOL/F-02



21	20	19
24	23	22

E14
W



3	1	2

E42
GR

ENGINE CONTROL SYSTEM

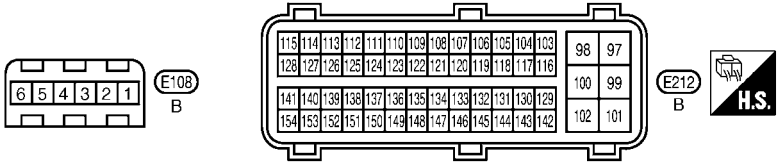
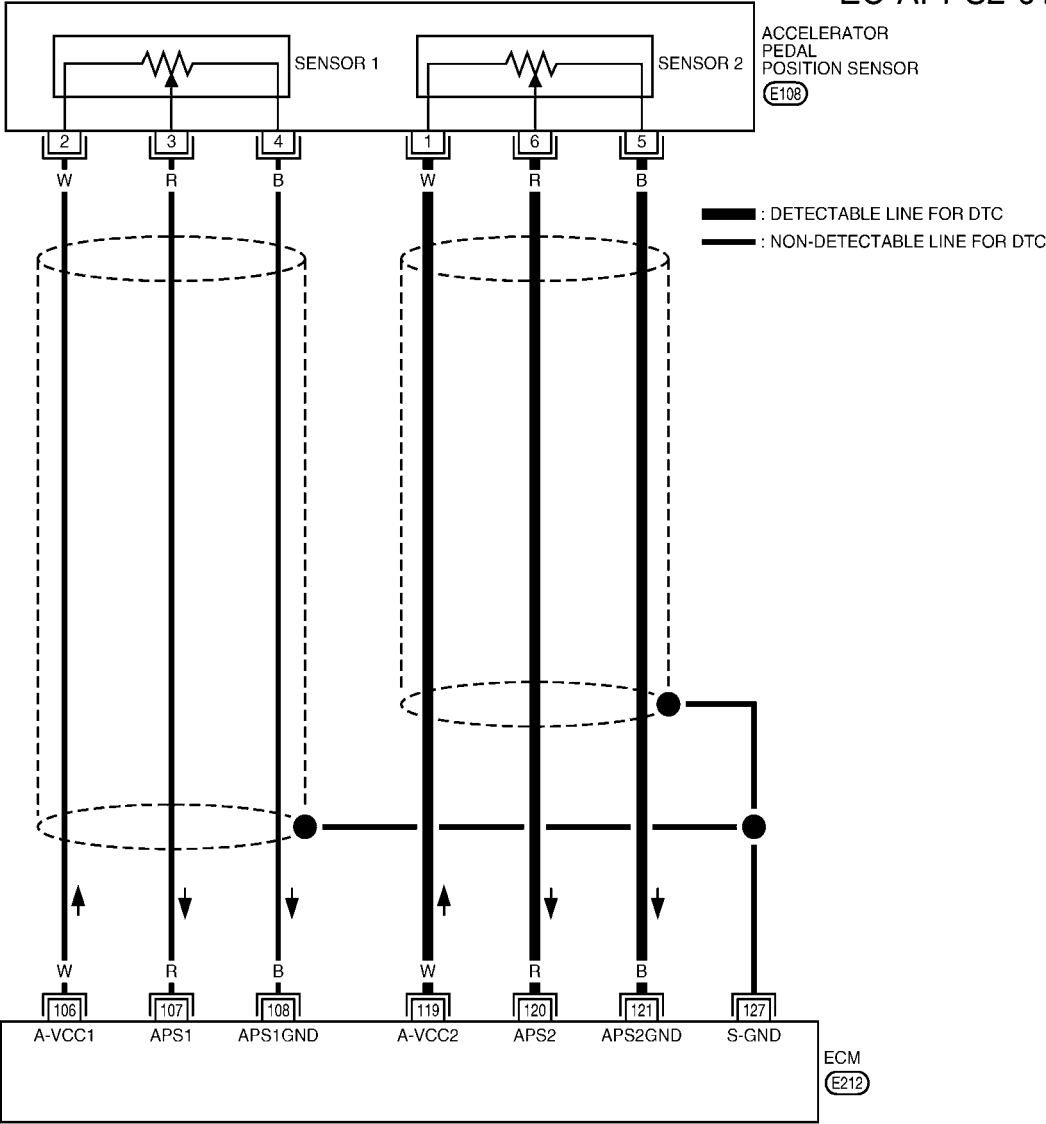
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[YD25DDTi]

Wiring Diagram - APPS2 -

INFOID:000000006106749

EC-APPS2-01



JMBWA0377GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - TCC/V -

INFOID:000000006106750

EC-TCC/V-01

A

EC

C

D

E

F

G

H

I

J

K

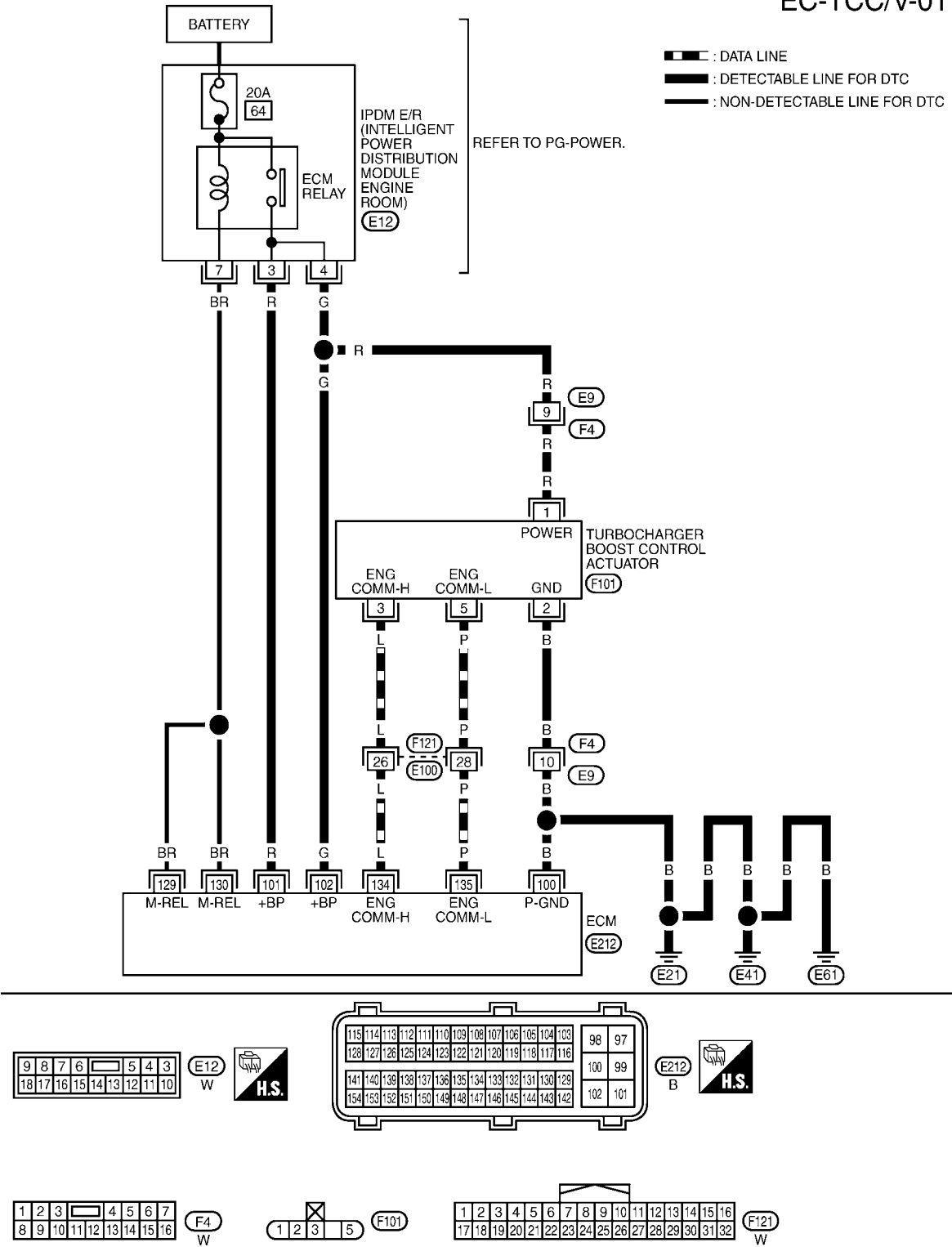
L

M

N

O

P



ENGINE CONTROL SYSTEM

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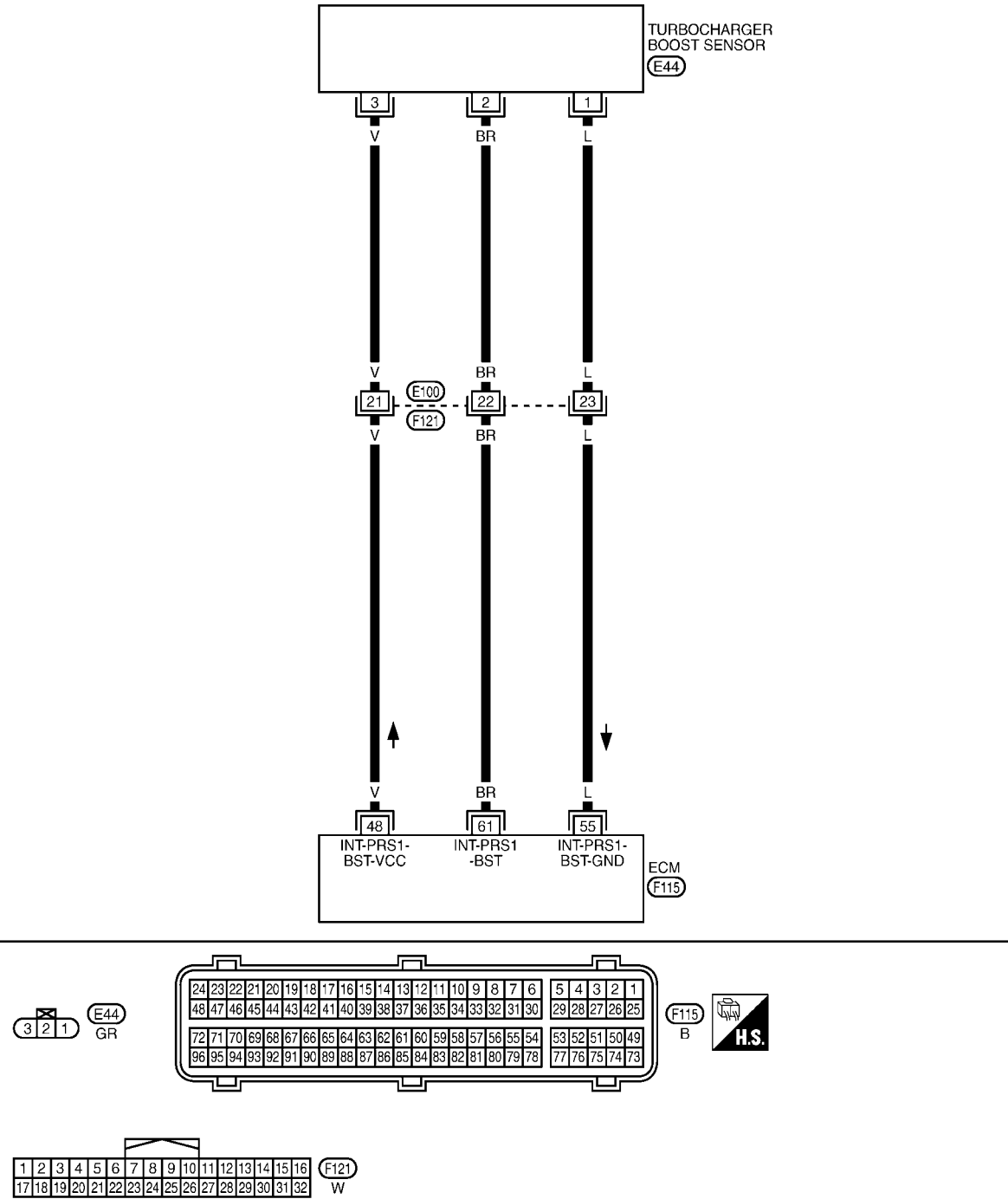
[YD25DDTi]

Wiring Diagram - BOOST -

INFOID:000000006106751

EC-BOOST-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0378GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

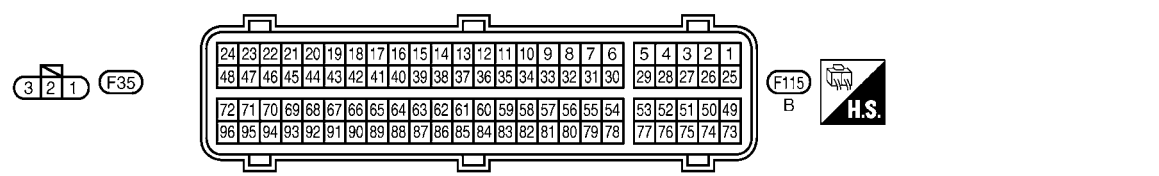
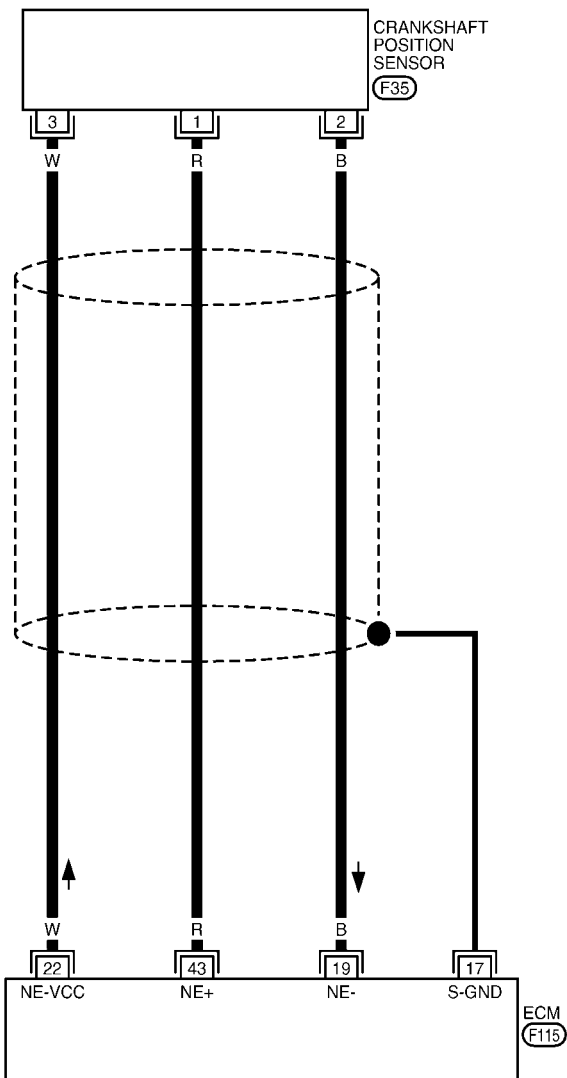
[YD25DDTi]

Wiring Diagram - CKPS -

INFOID:000000006106752

EC-CKPS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0379GB

ENGINE CONTROL SYSTEM

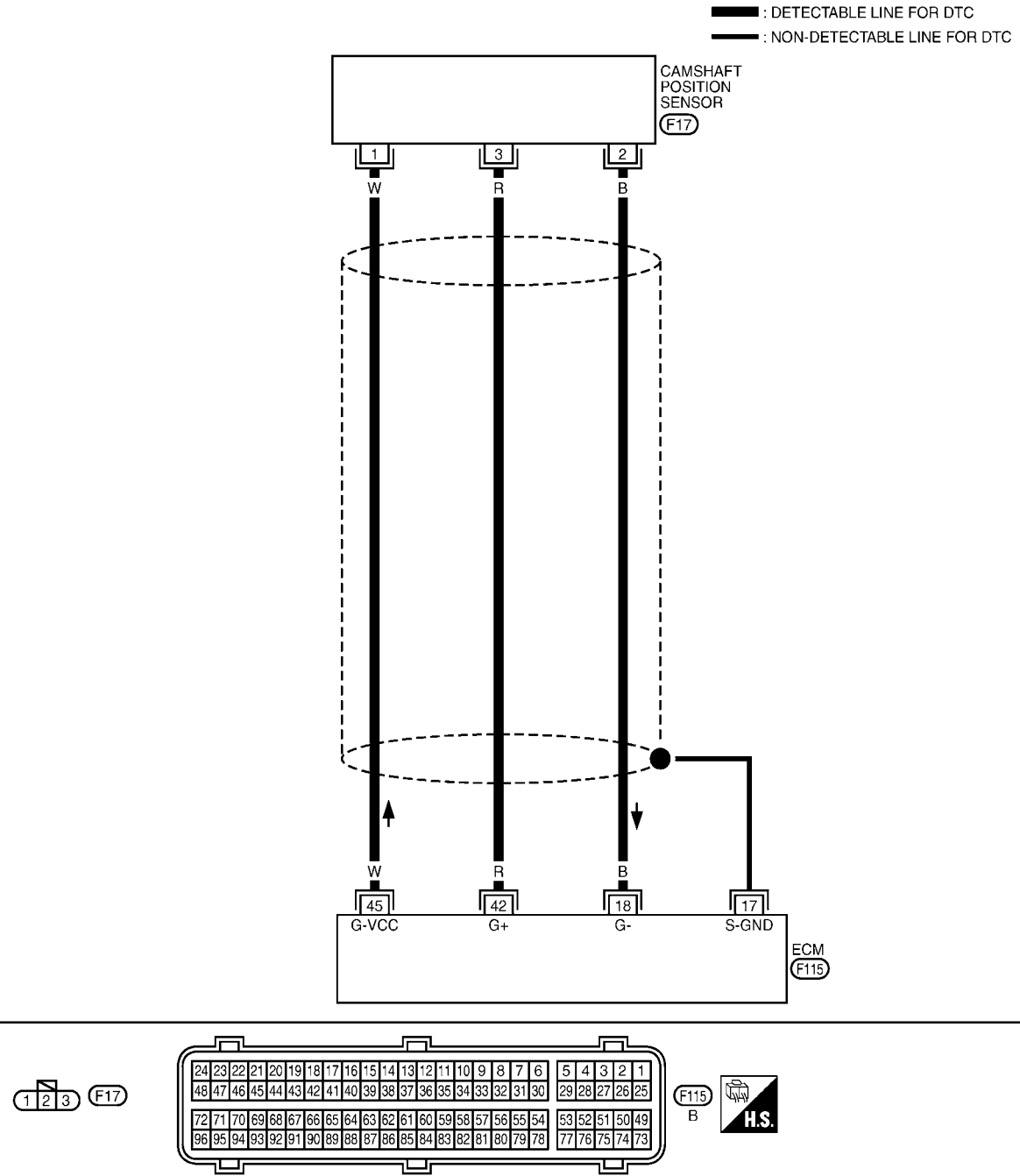
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[YD25DDTi]

Wiring Diagram - CMPS -

INFOID:000000006106753

EC-CMPS-01



JMBWA0380GB

ENGINE CONTROL SYSTEM

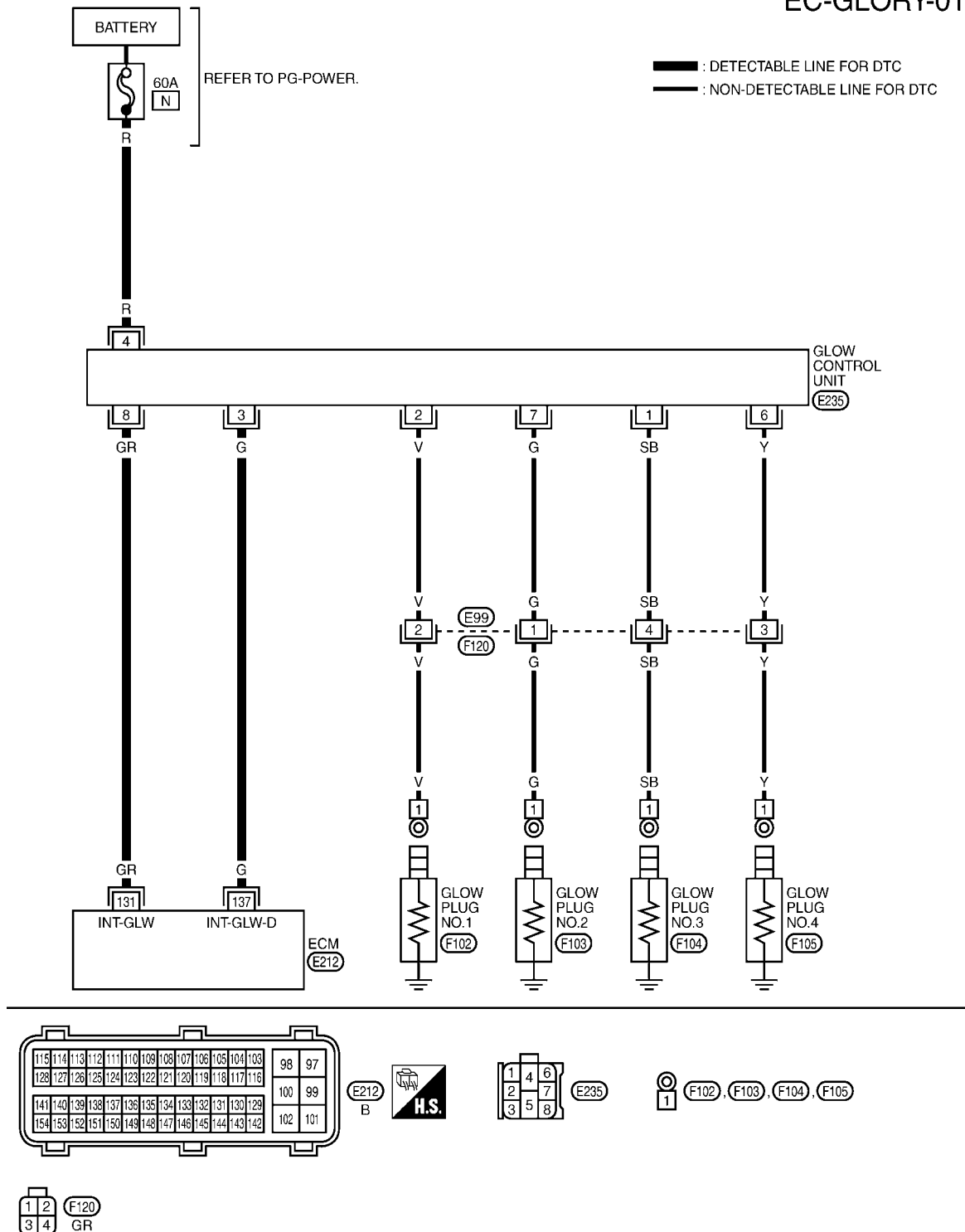
[YD25DDTi]

< WIRING DIAGRAM >

Wiring Diagram - GLORLY -

INFOID:0000000006106754

EC-GLORY-01



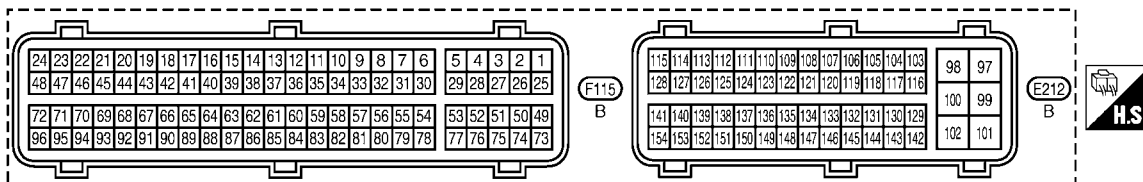
JMBWA0381GB

[YD25DDTî]

Wiring Diagram - EGRC1 -

EC-EGRC1-01

— : NON-DETECTABLE LINE FOR DTC



EC-1004

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

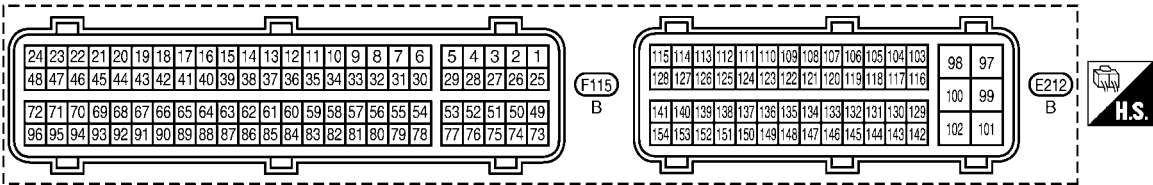
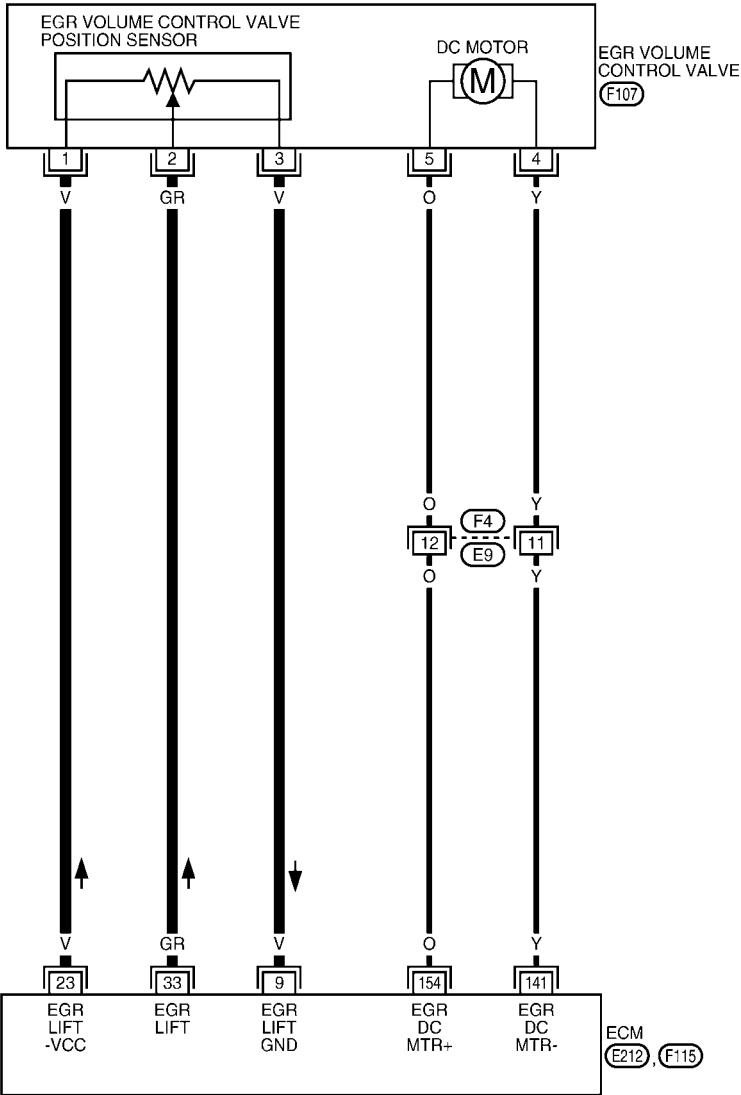
[YD25DDTi]

Wiring Diagram - EGRC3 -

INFOID:000000006106756

EC-EGRC3-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0383GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

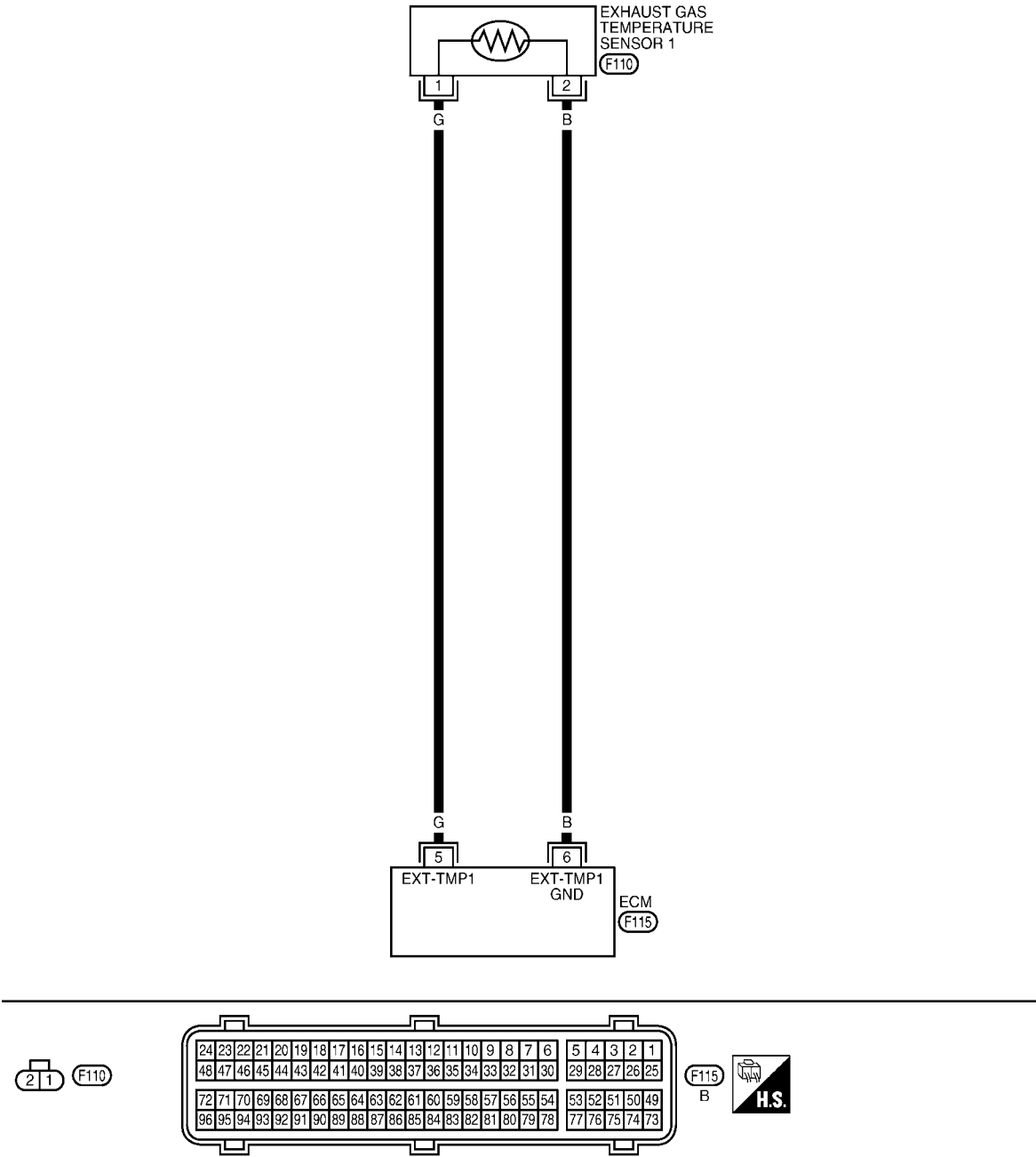
[YD25DDTi]

Wiring Diagram - EGTS1 -

INFOID:000000006106757

EC-EGTS1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0384GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

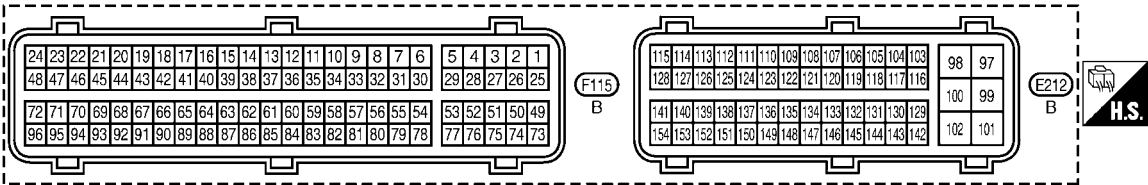
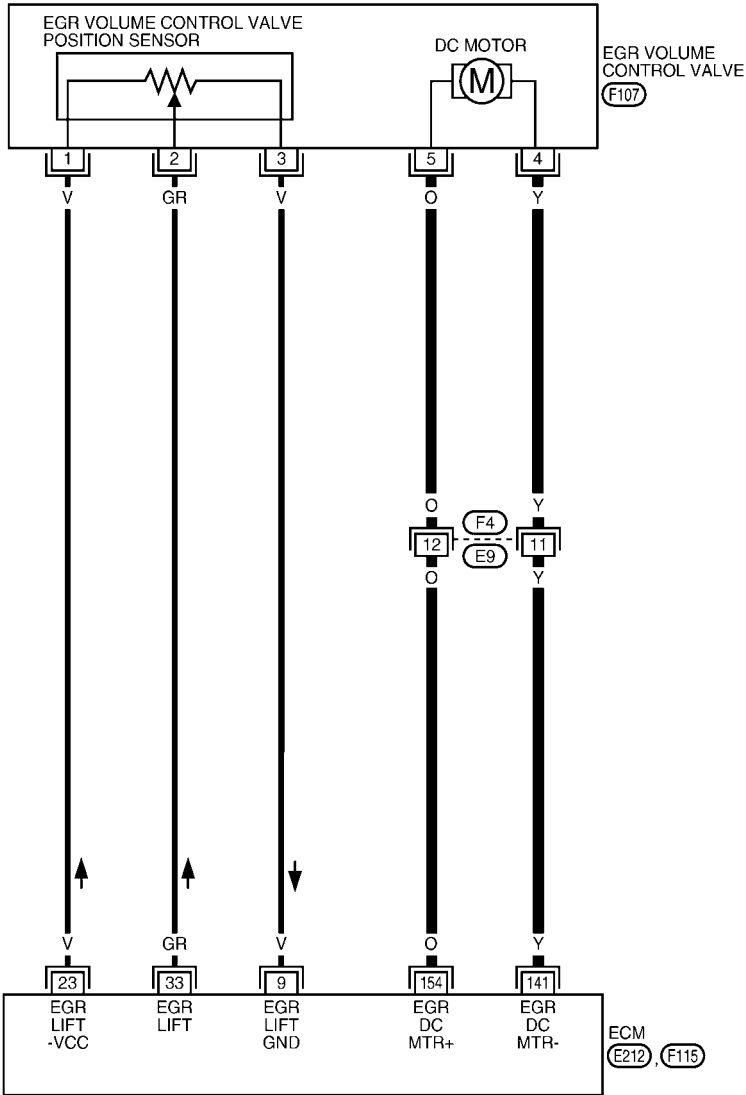
[YD25DDTi]

Wiring Diagram - EGRC2 -

INFOID:000000006106758

EC-EGRC2-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0388GB

ENGINE CONTROL SYSTEM

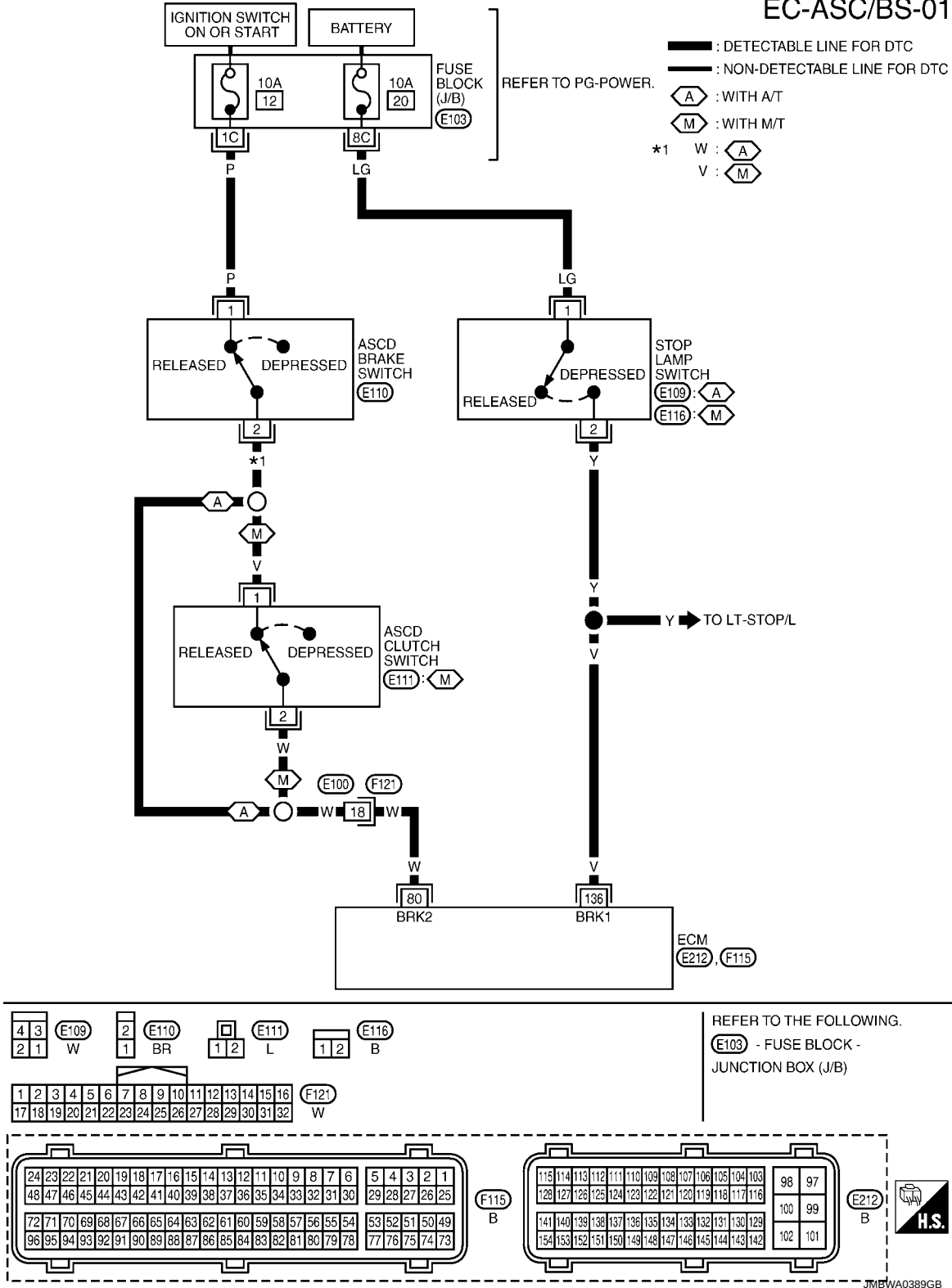
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[YD25DDTi]

Wiring Diagram - ASC/BS -

INFOID:000000006106759

EC-ASC/BS-01



ENGINE CONTROL SYSTEM

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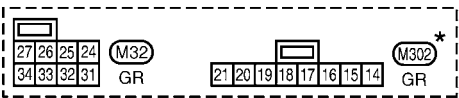
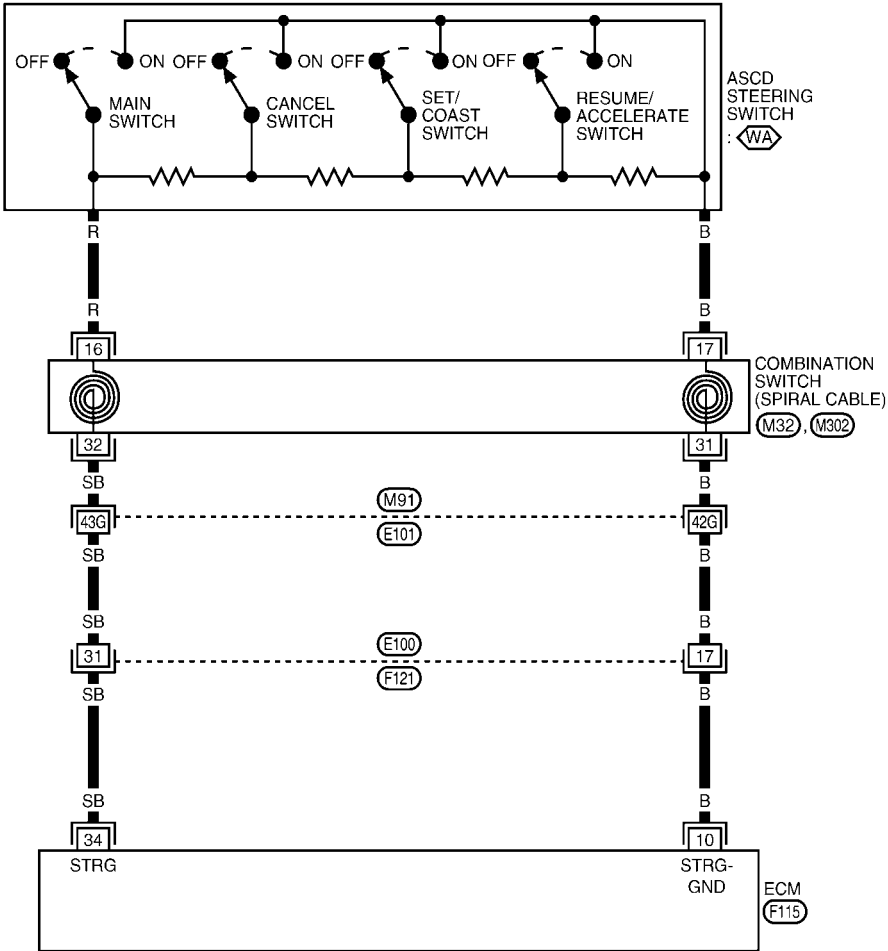
[YD25DDTi]

Wiring Diagram - ASC/SW -

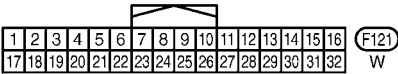
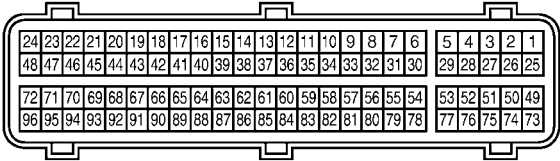
INFOID:000000006106760

EC-ASC/SW-01

- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- WA : WITH ASCD



REFER TO THE FOLLOWING.
(M91) - SUPER MULTIPLE JUNCTION (SMJ)



* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

JMBWA0507GB

ENGINE CONTROL SYSTEM

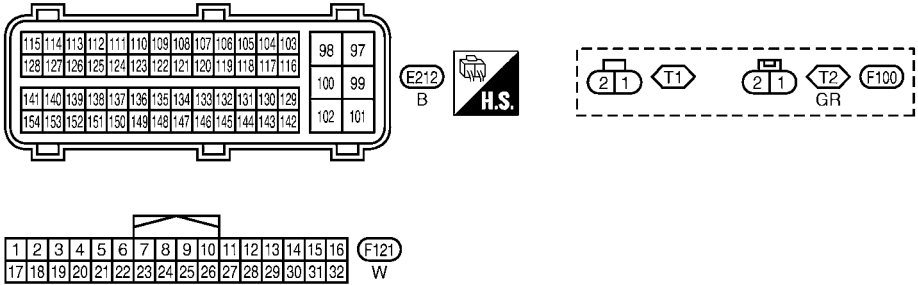
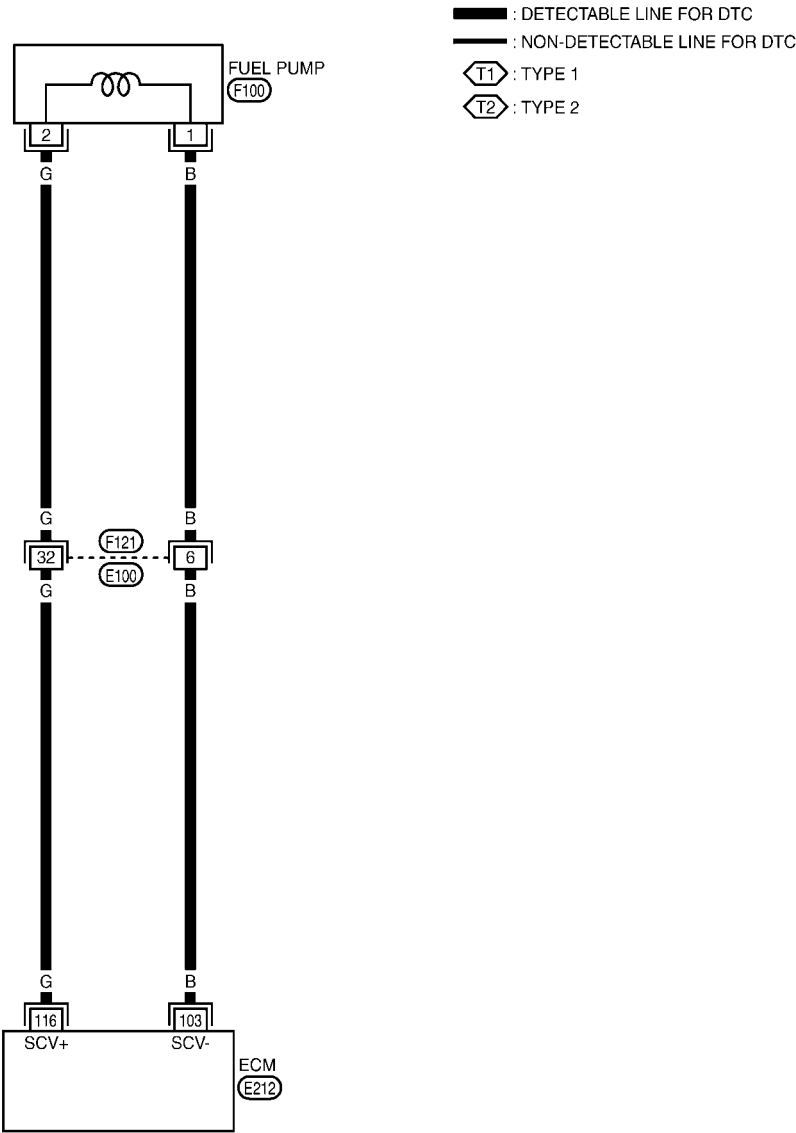
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[YD25DDTi]

Wiring Diagram - F/PUMP -

INFOID:000000006106761

EC-F/PUMP-01



JMBWA1226GB

ENGINE CONTROL SYSTEM

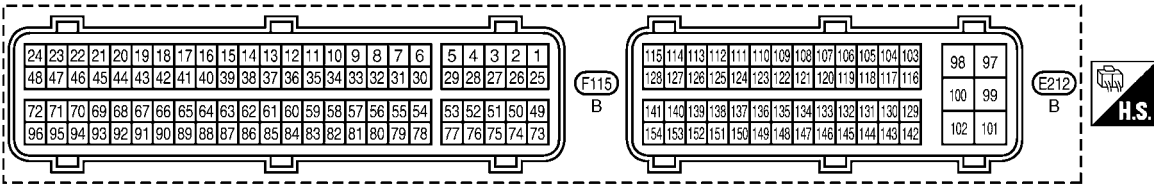
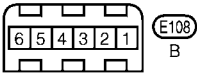
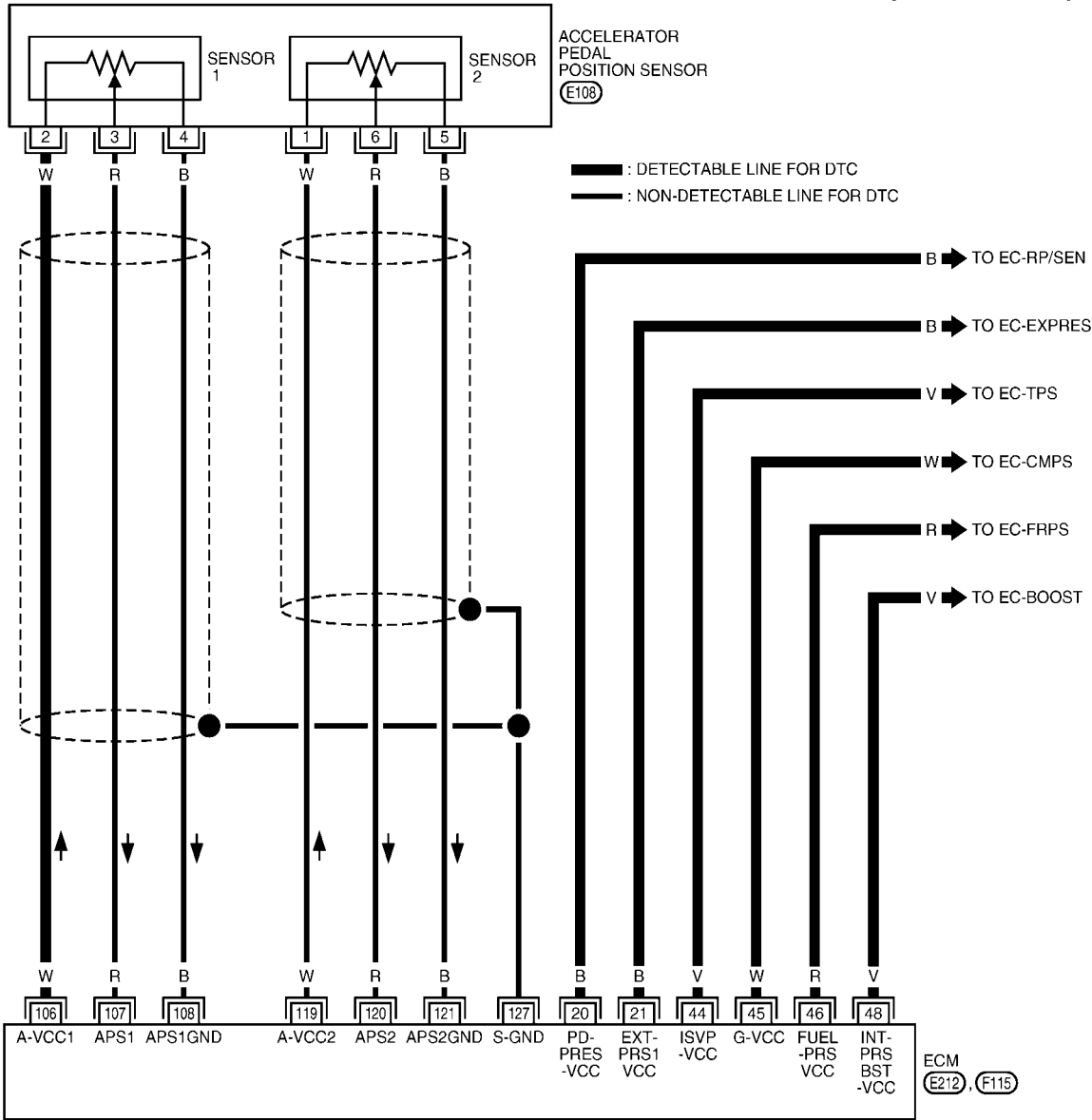
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[YD25DDTi]

Wiring Diagram - APP1PW -

INFOID:000000006106762

EC-APP1PW-01



JMBWA0500GB

ENGINE CONTROL SYSTEM

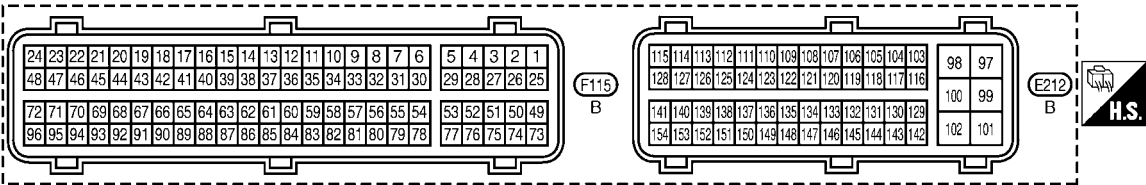
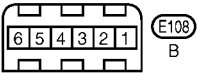
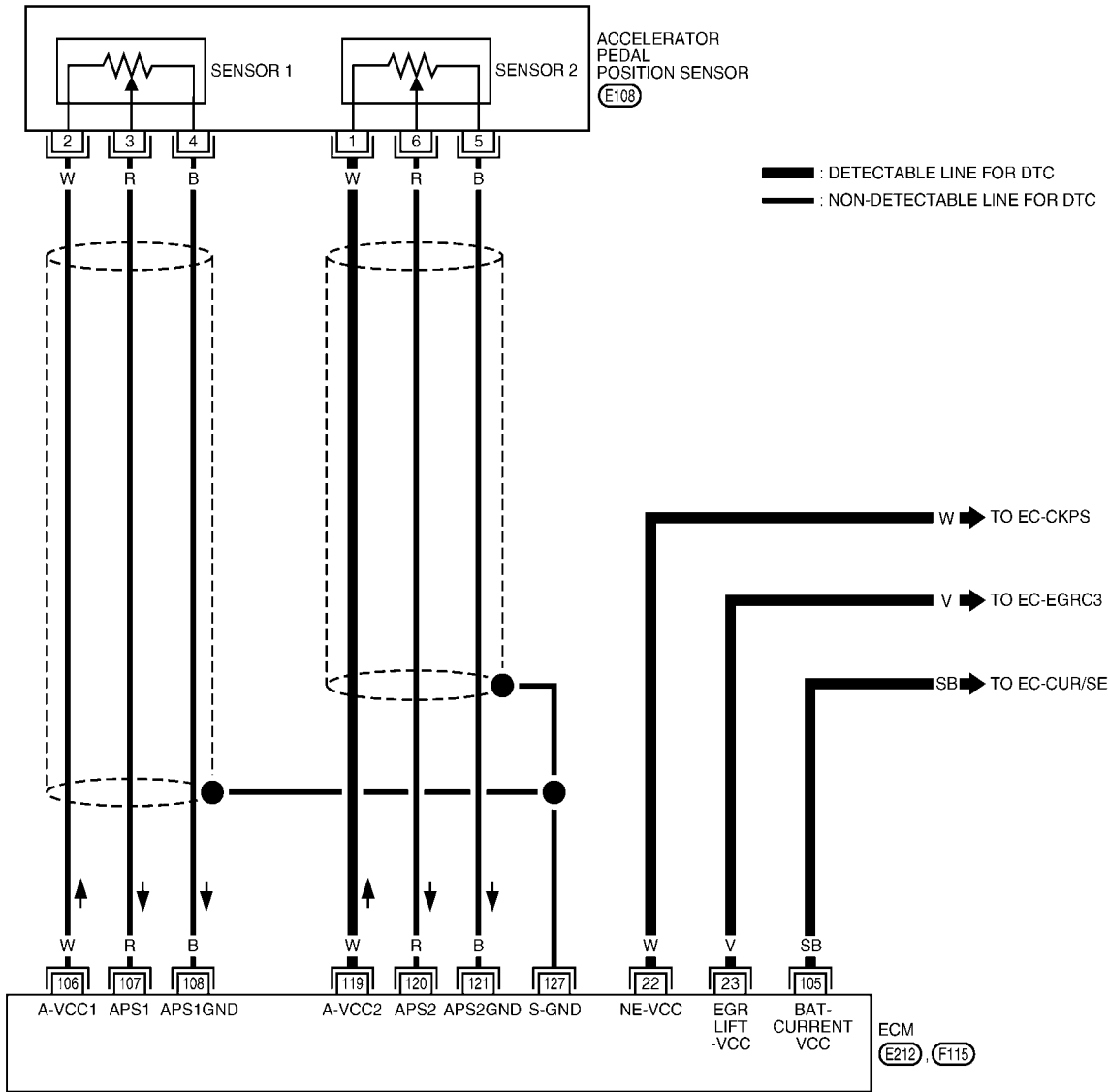
< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - APP2PW -

INFOID:000000006106763

EC-APP2PW-01



JMBWA0393GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

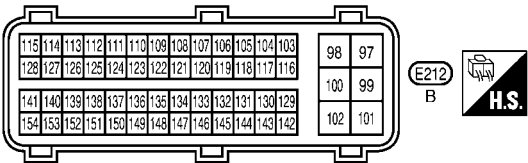
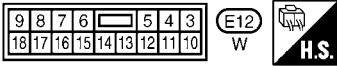
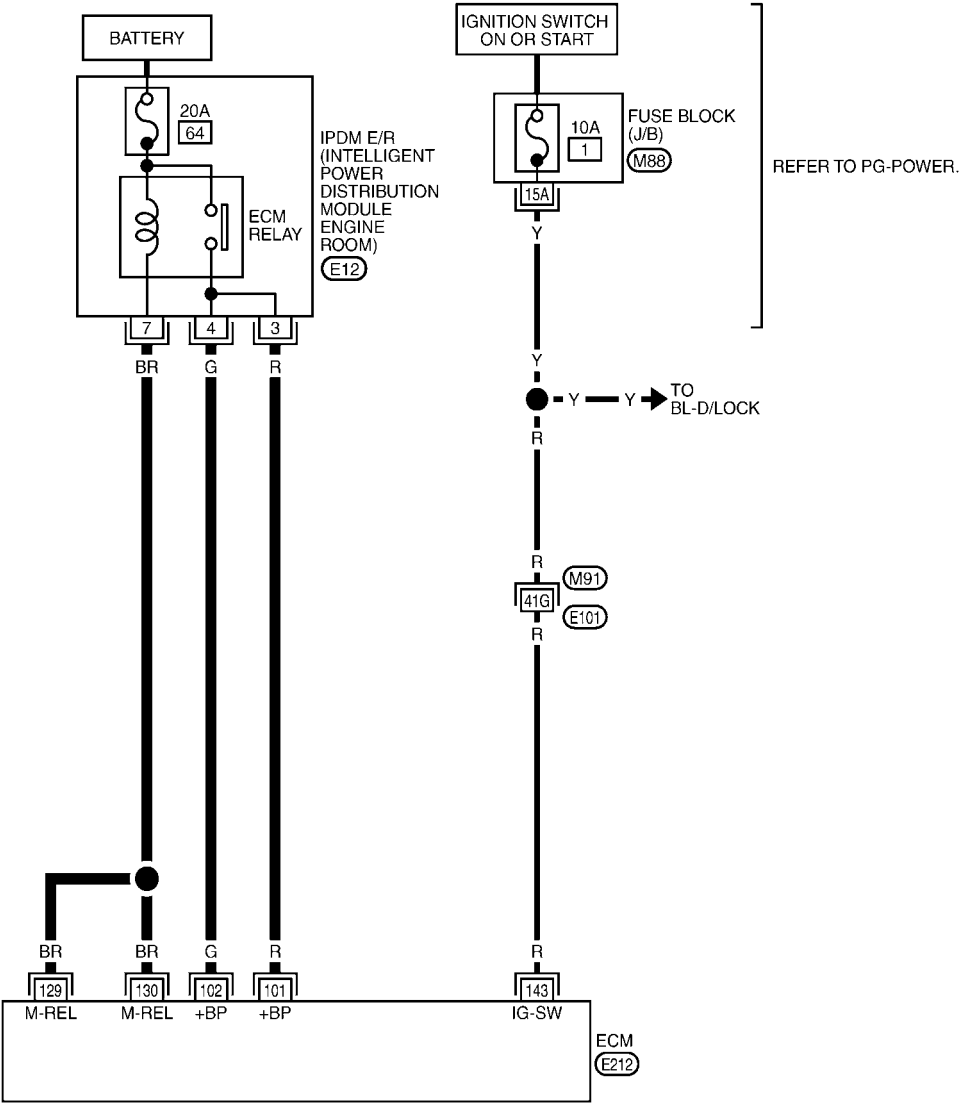
[YD25DDTi]

Wiring Diagram - ECMRLY -

INFOID:000000006106764

EC-ECMRLY-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

- (M88) - FUSE BLOCK - JUNCTION BOX (J/B)
- (M91) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0502GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

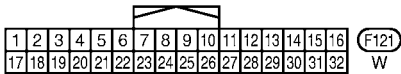
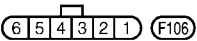
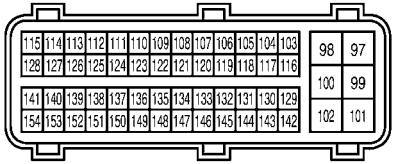
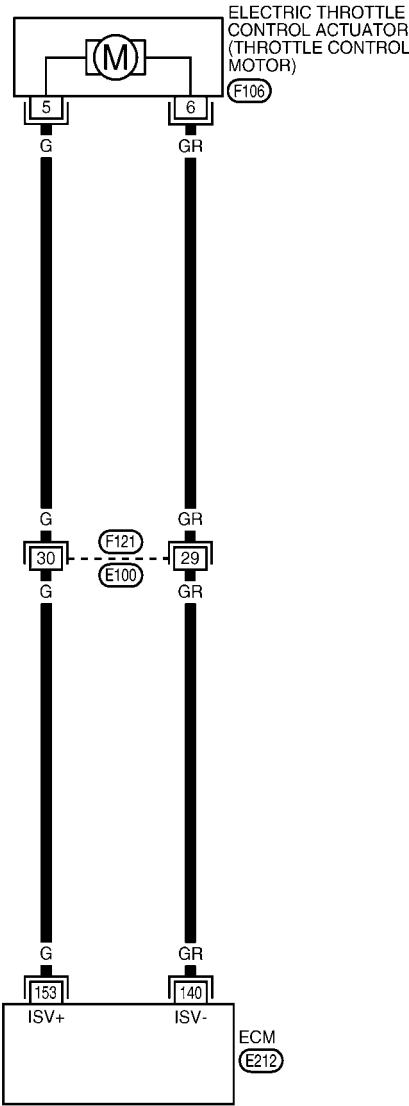
[YD25DDTi]

Wiring Diagram - ETC -

INFOID:000000006106765

EC-ETC-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0396GB

ENGINE CONTROL SYSTEM

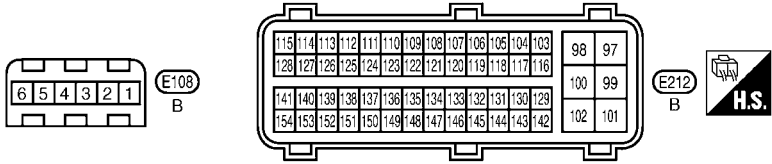
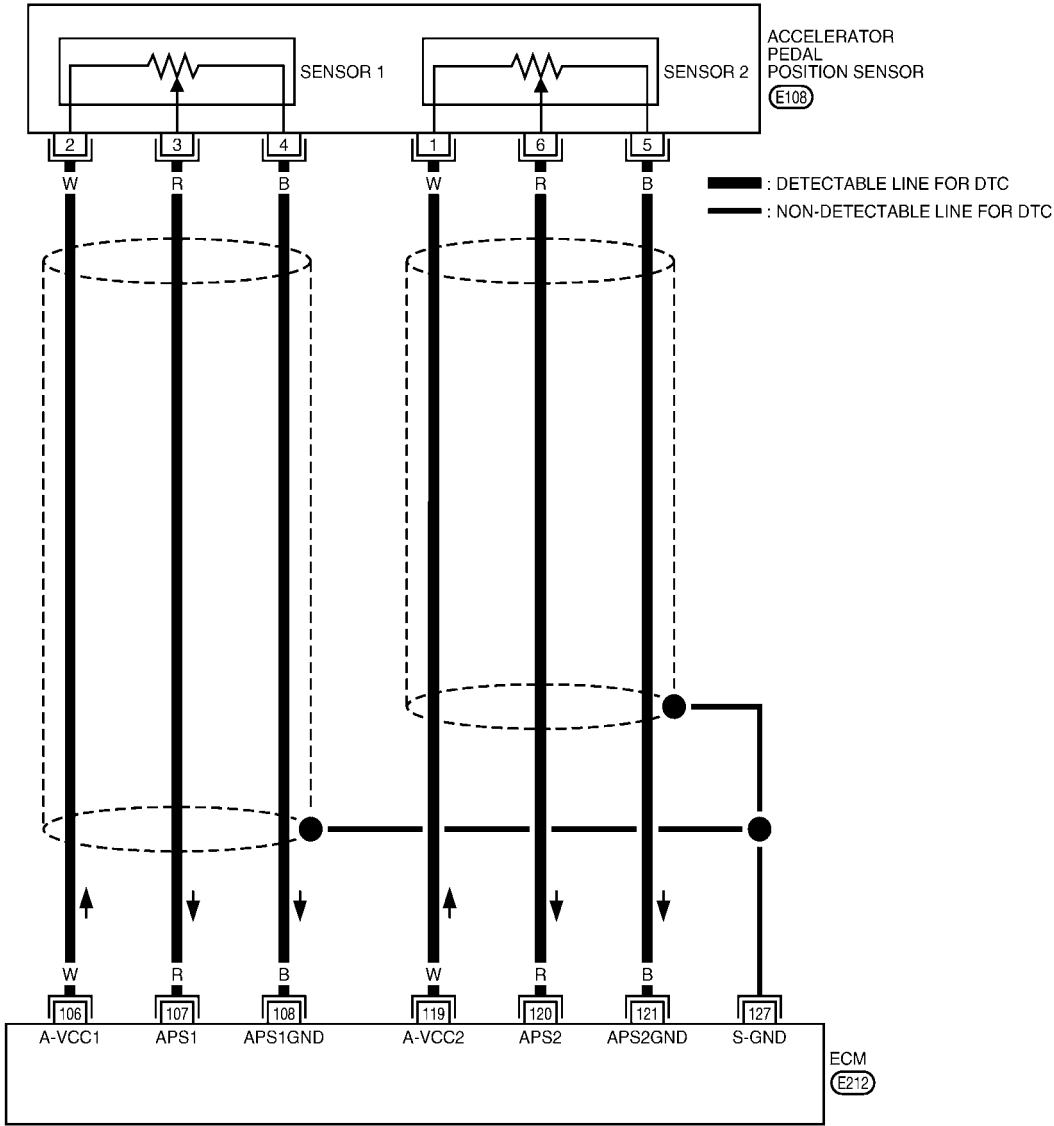
< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - APPS3 -

INFOID:000000006106766

EC-APPS3-01



JMBWA0397GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

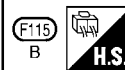
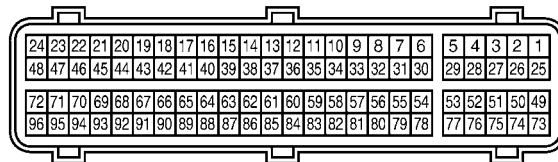
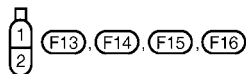
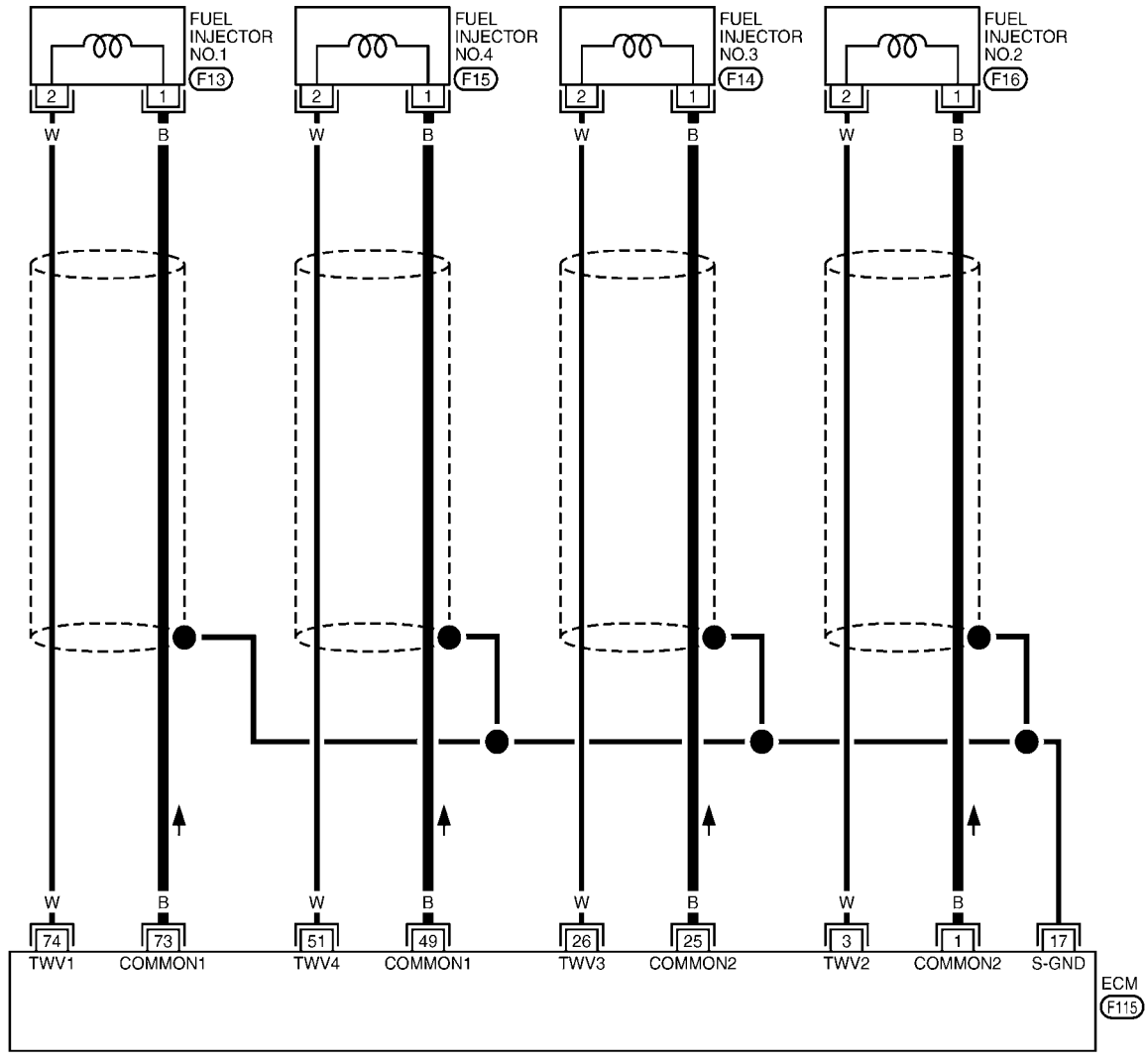
[YD25DDTi]

Wiring Diagram - INJ/PW -

INFOID:000000006106767

EC-INJ/PW-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



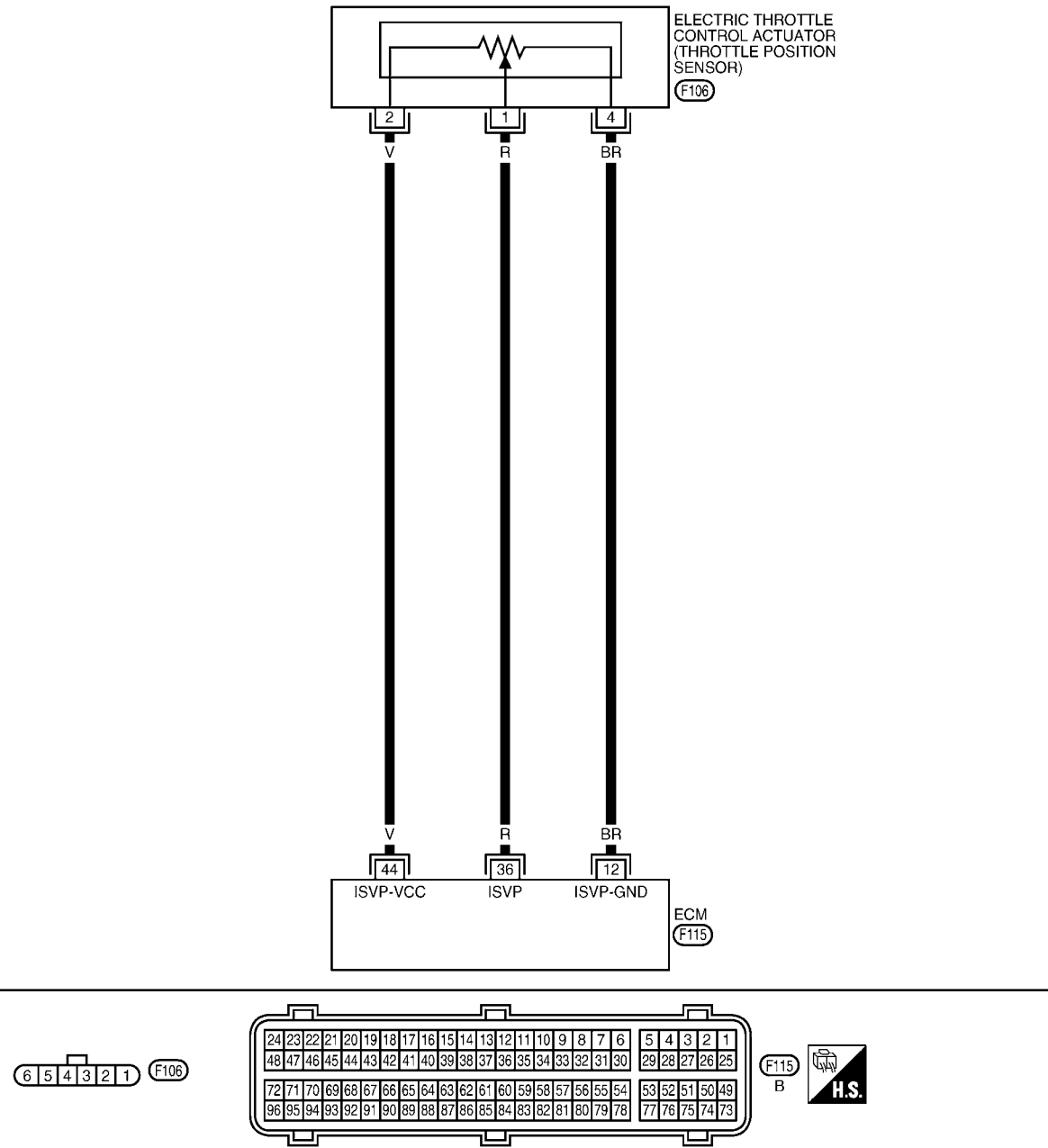
JMBWA0398GB

Wiring Diagram - TPS -

INFOID:000000006106768

EC-TPS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0399GB

ENGINE CONTROL SYSTEM

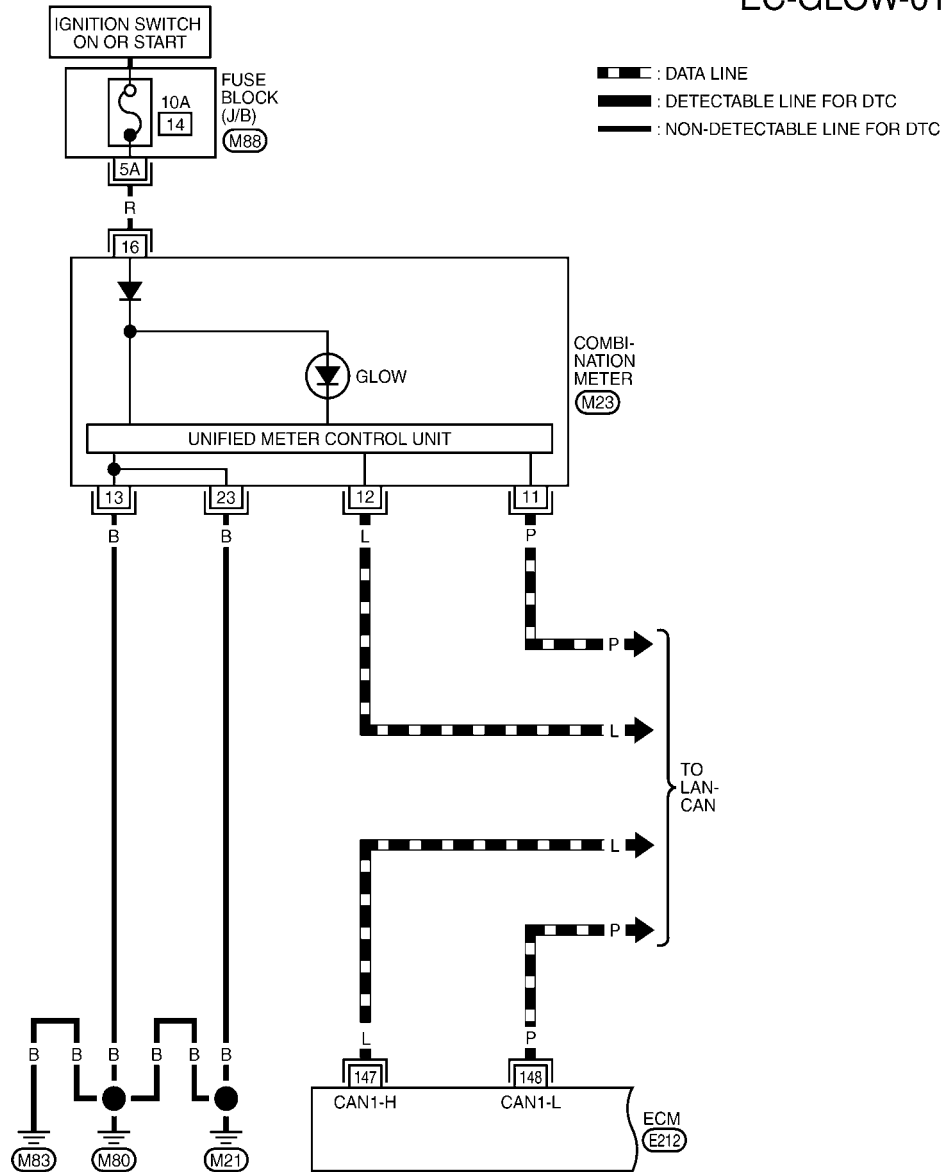
< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - GLOW -

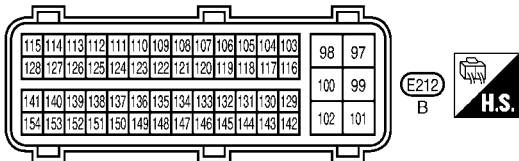
INFOID:000000006106769

EC-GLOW-01



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

(M23) W



REFER TO THE FOLLOWING.

(M88) - FUSE BLOCK - JUNCTION BOX (J/B)

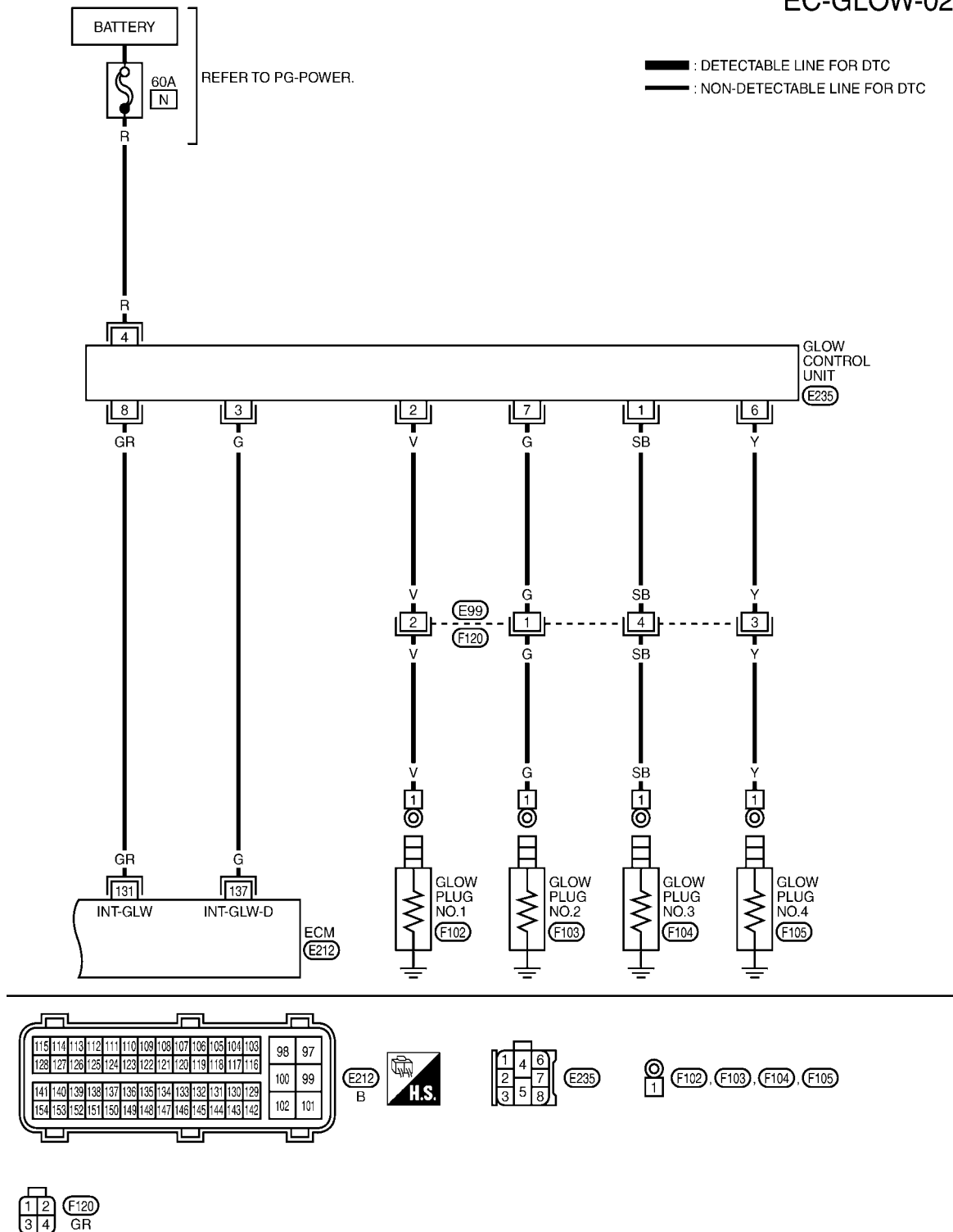
JMBWA0400GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]

EC-GLOW-02

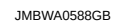


JMBWA0401GB

[YD25DDTî]

Wiring Diagram - TCCSV -

EC-TCCSV-01



ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

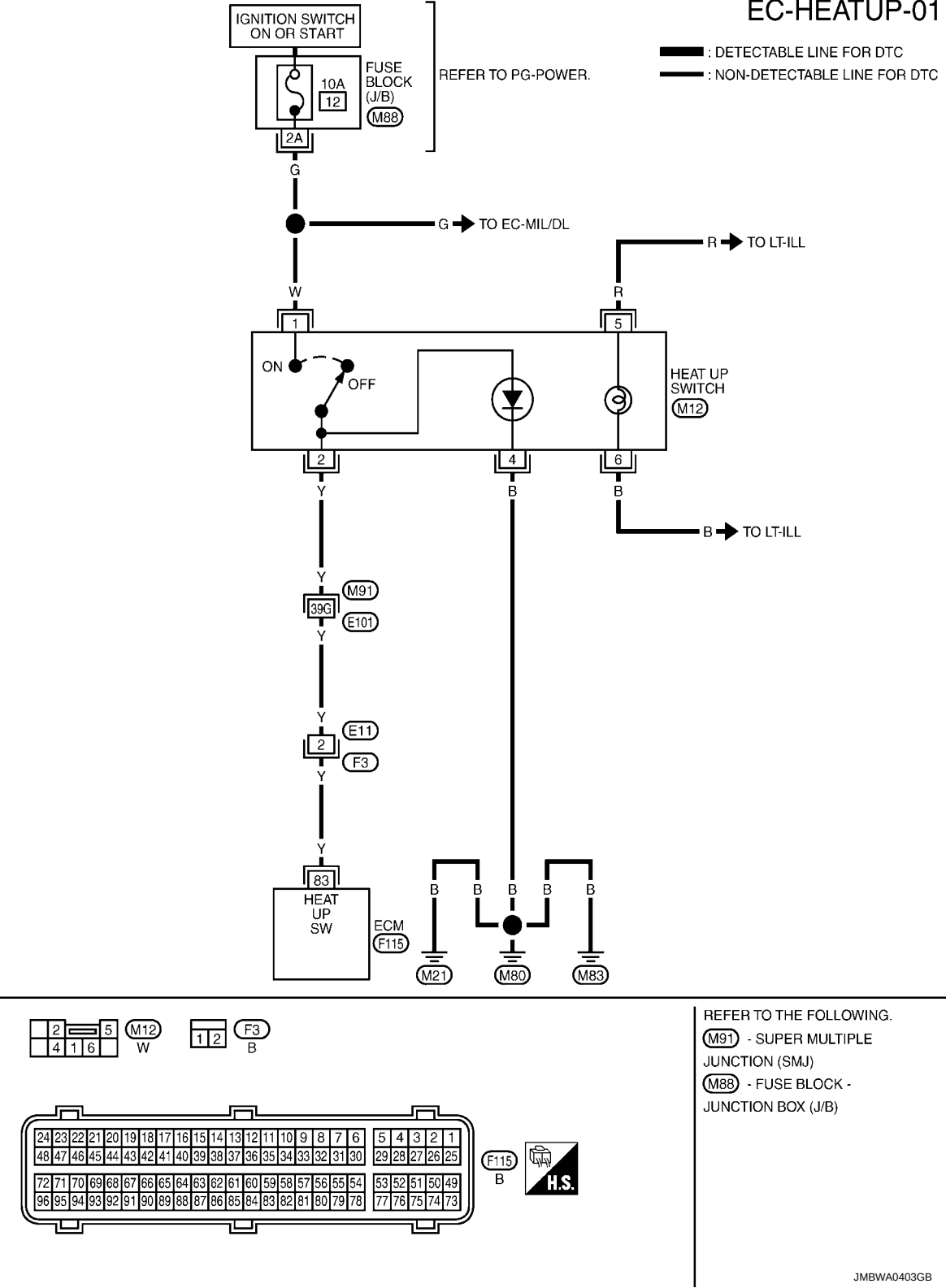
[YD25DDTi]

Wiring Diagram - HEATUP -

INFOID:000000006106771

EC-HEATUP-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

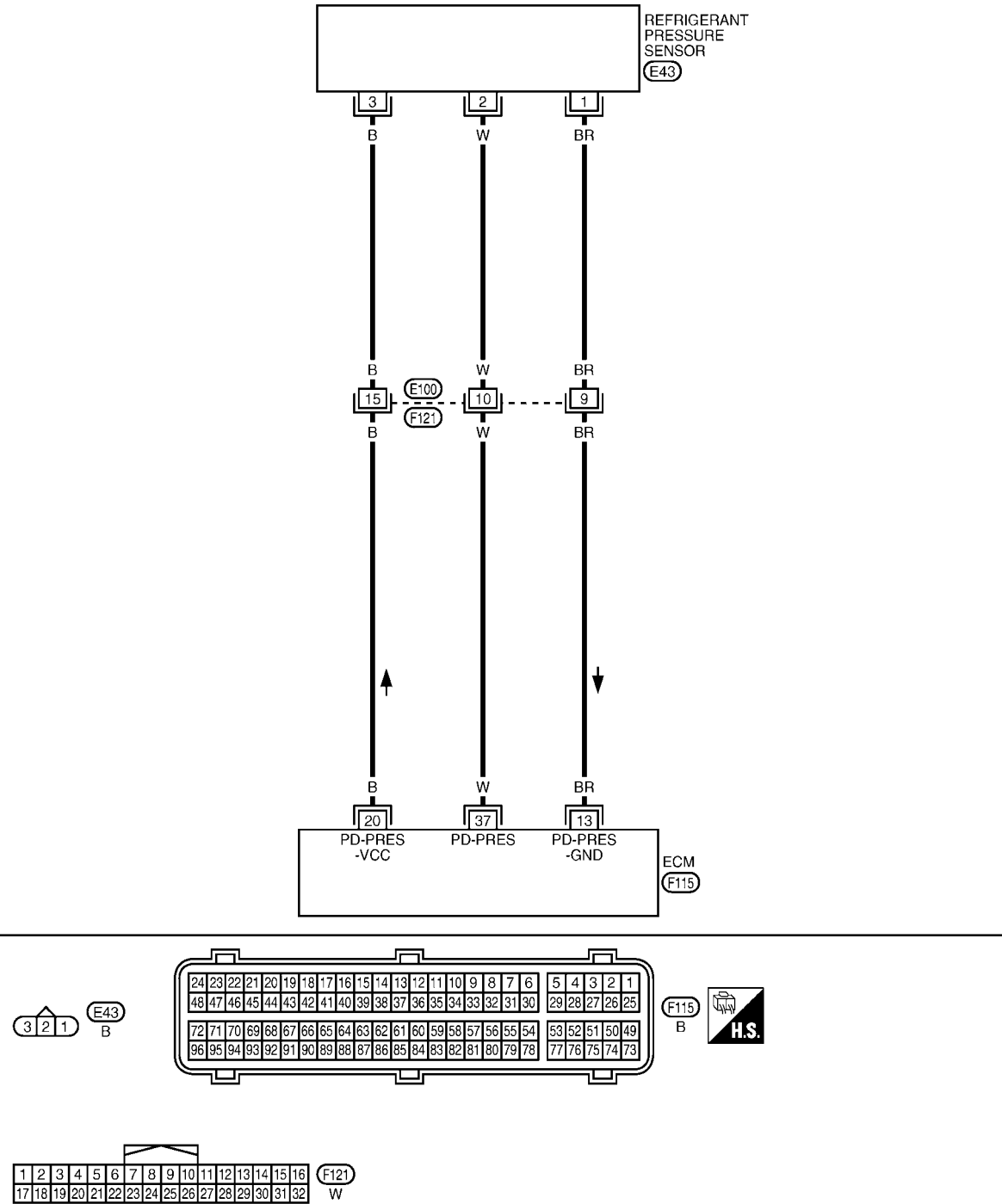
[YD25DDTi]

Wiring Diagram - RP/SEN -

INFOID:000000006106772

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0405GB

ENGINE CONTROL SYSTEM

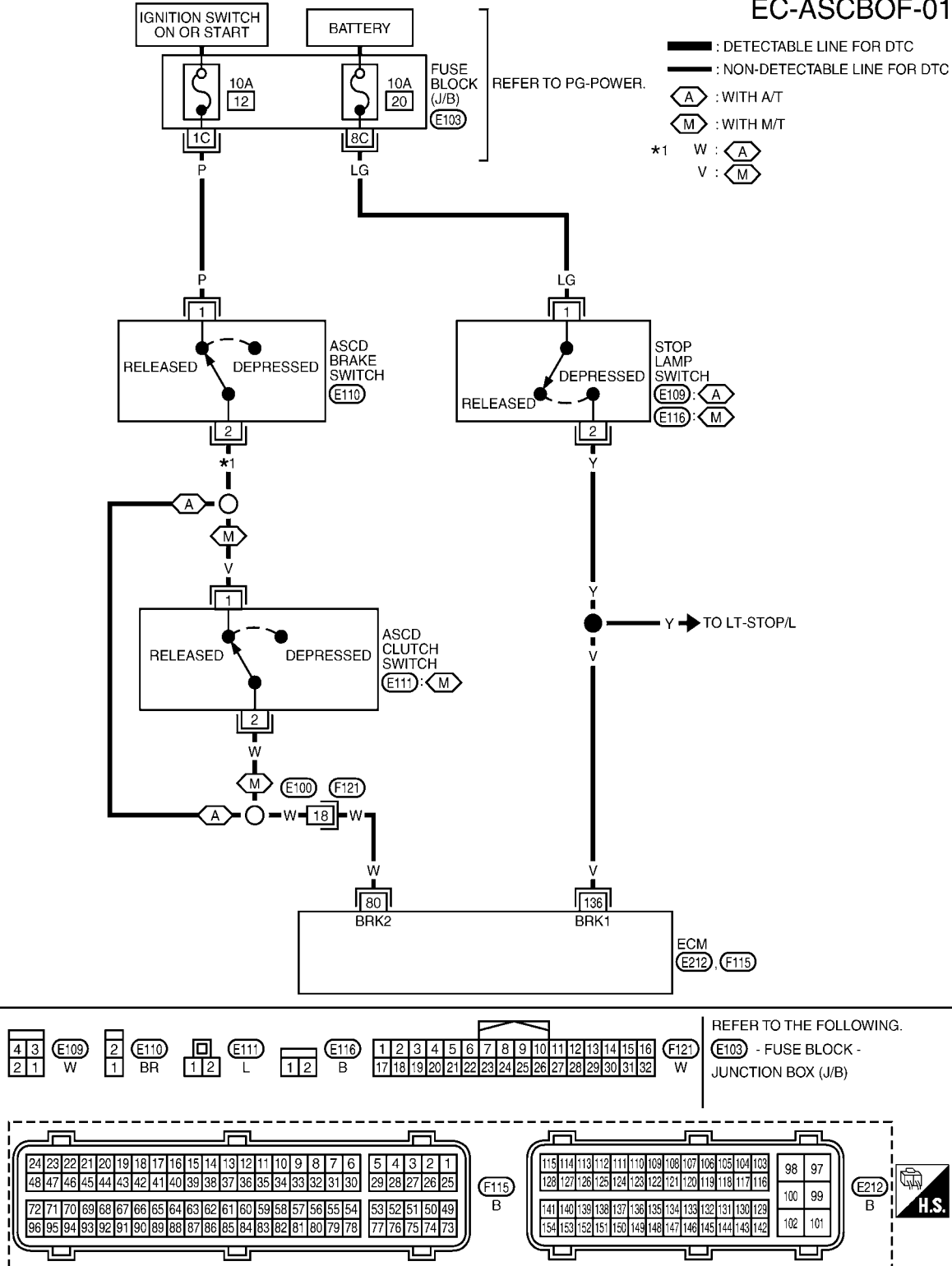
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[YD25DDTi]

Wiring Diagram - ASCBOF -

INFOID:000000006106773

EC-ASCBOF-01



JMBWA0406GB

ENGINE CONTROL SYSTEM

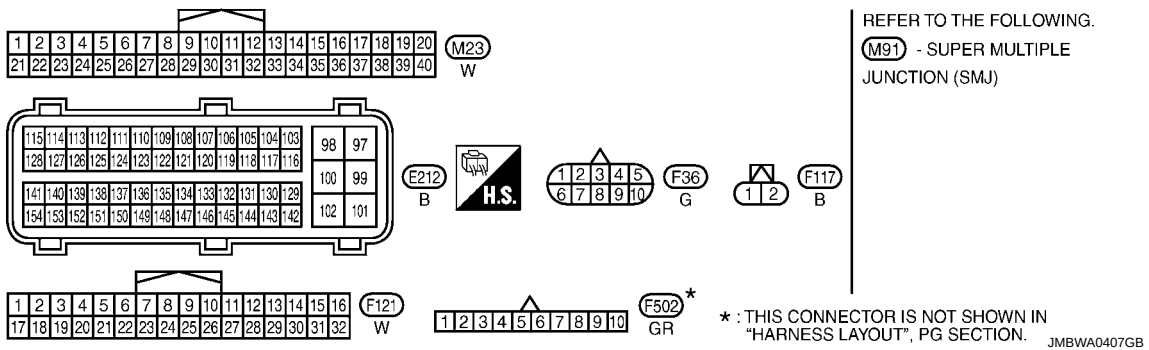
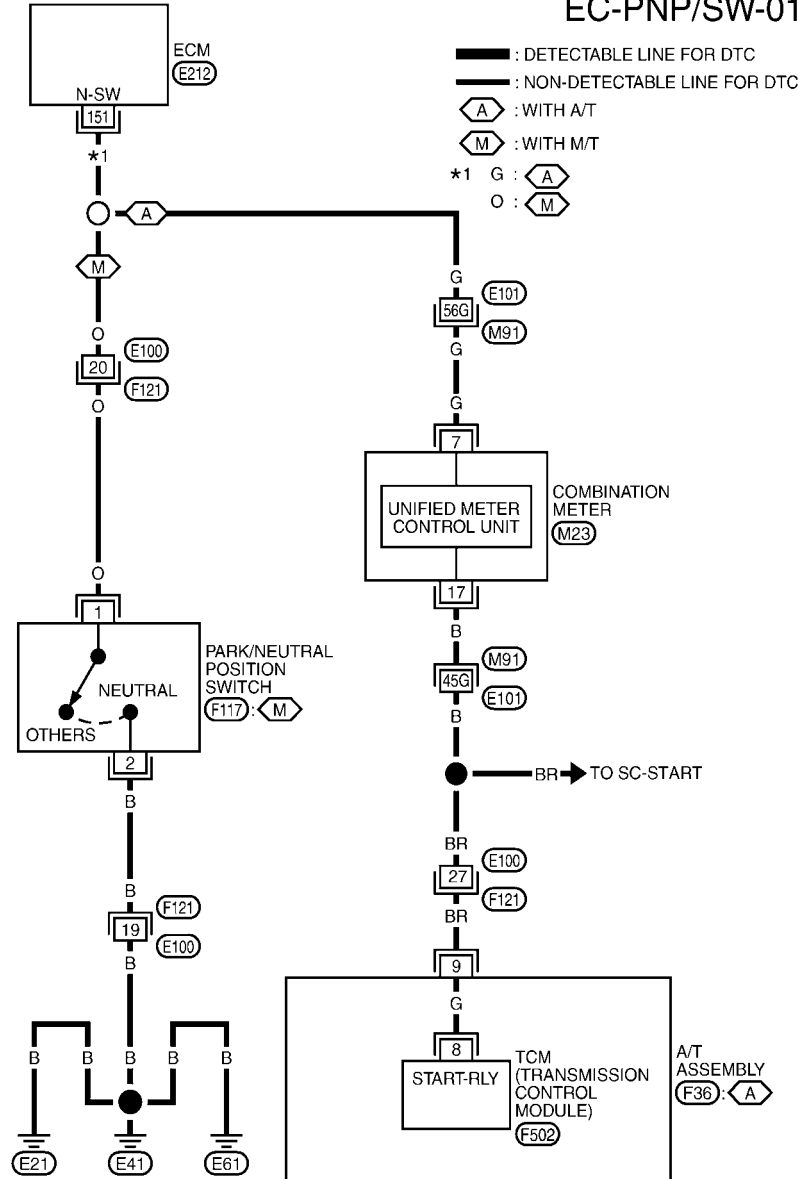
[YD25DDTi]

< WIRING DIAGRAM >

Wiring Diagram - PNP/SW -

INFOID:000000006106774

EC-PNP/SW-01



ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

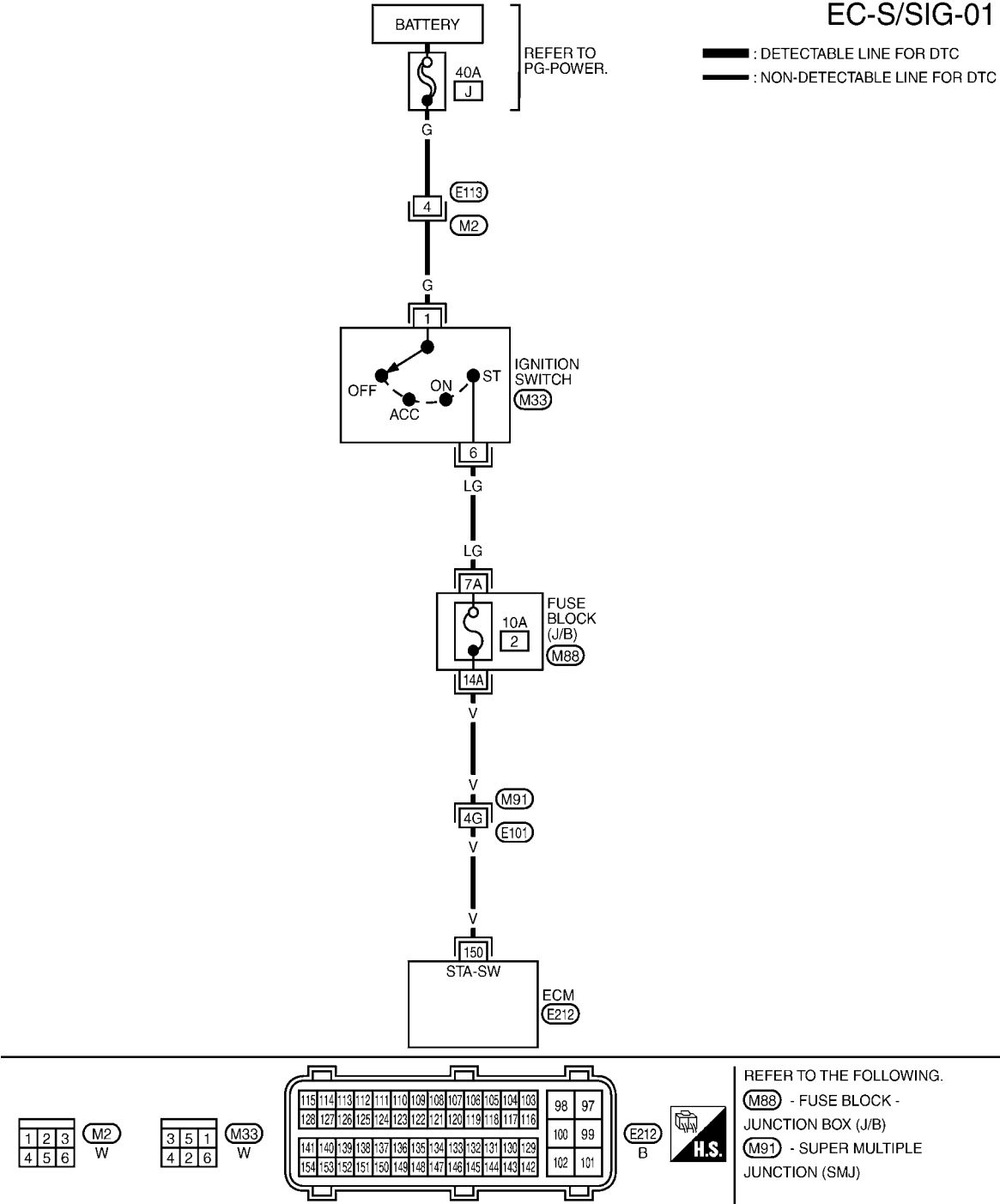
[YD25DDTi]

Wiring Diagram - S/SIG -

INFOID:000000006106775

EC-S/SIG-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0408GB

ENGINE CONTROL SYSTEM

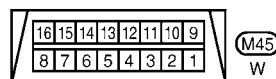
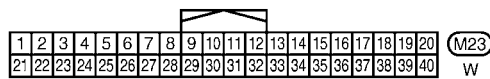
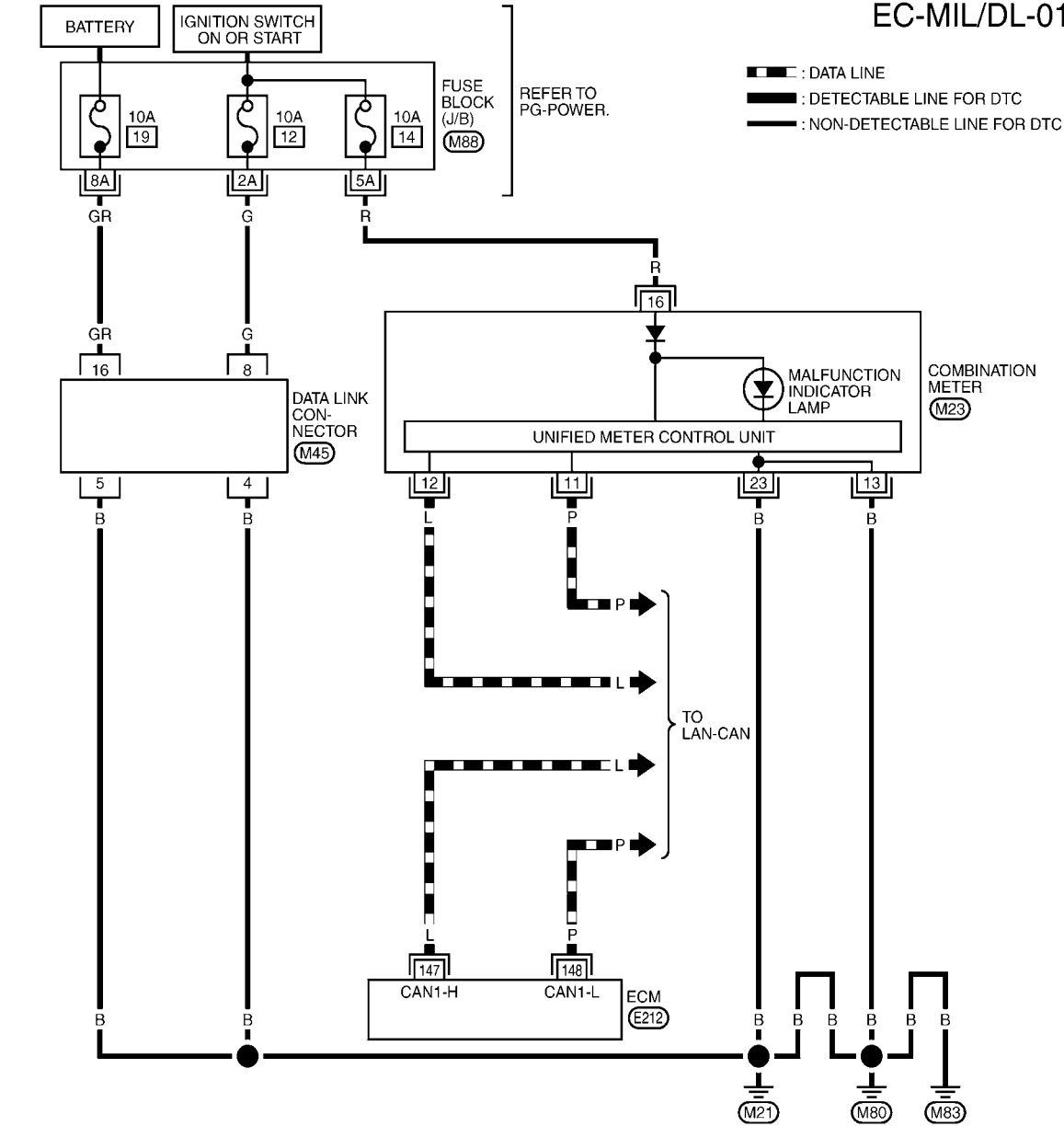
[YD25DDTi]

< WIRING DIAGRAM >

Wiring Diagram - MIL/DL -

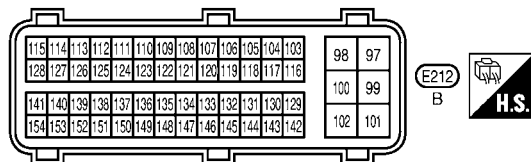
INFOID:000000006106776

EC-MIL/DL-01



REFER TO THE FOLLOWING.

(M88) - FUSE BLOCK - JUNCTION BOX (J/B)



JMBWA0581GB

ENGINE CONTROL SYSTEM

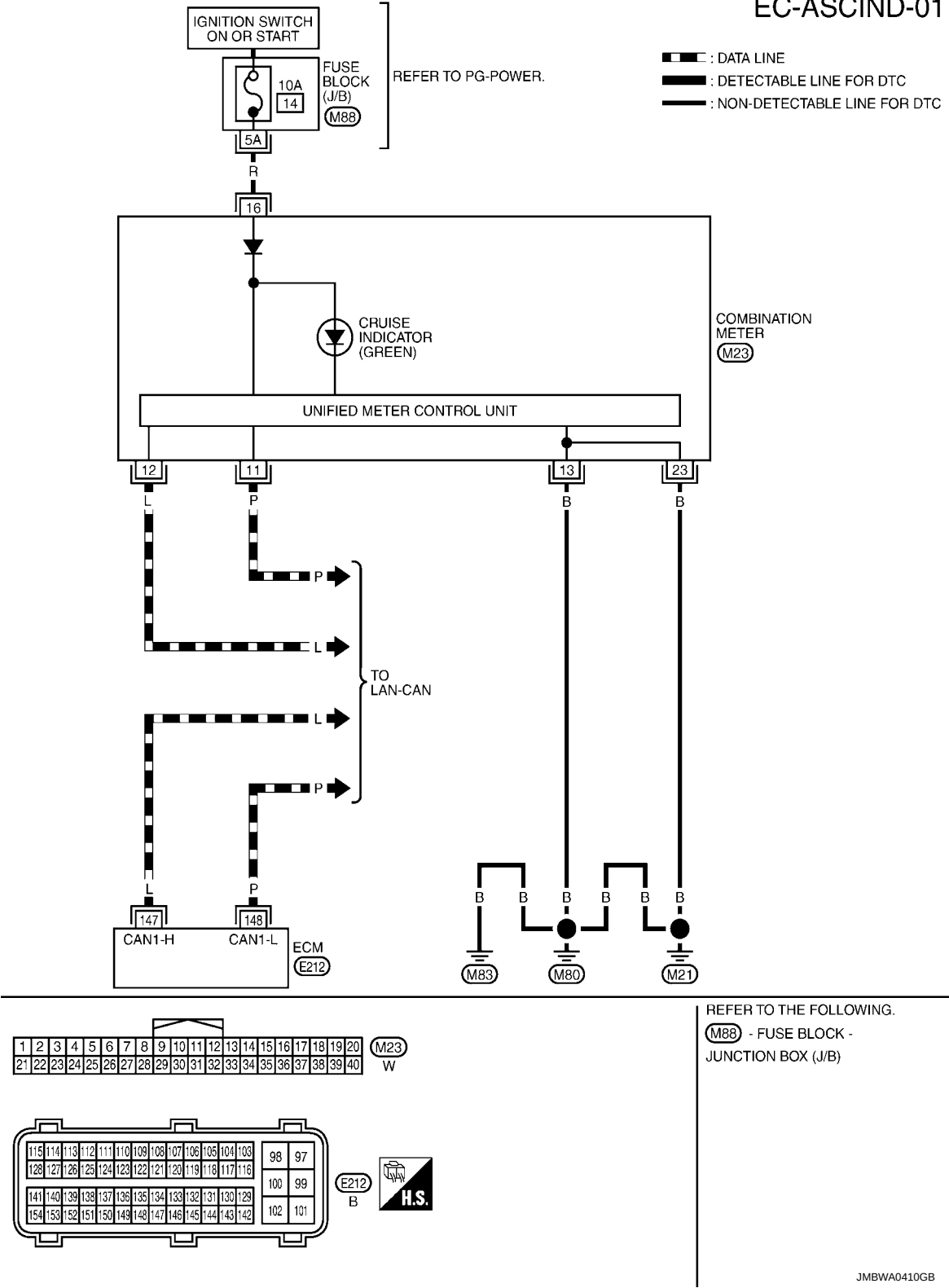
< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - ASCIND -

INFOID:000000006106777

EC-ASCIND-01



ENGINE CONTROL SYSTEM

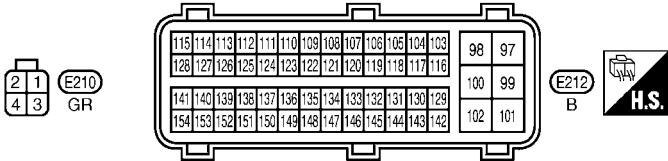
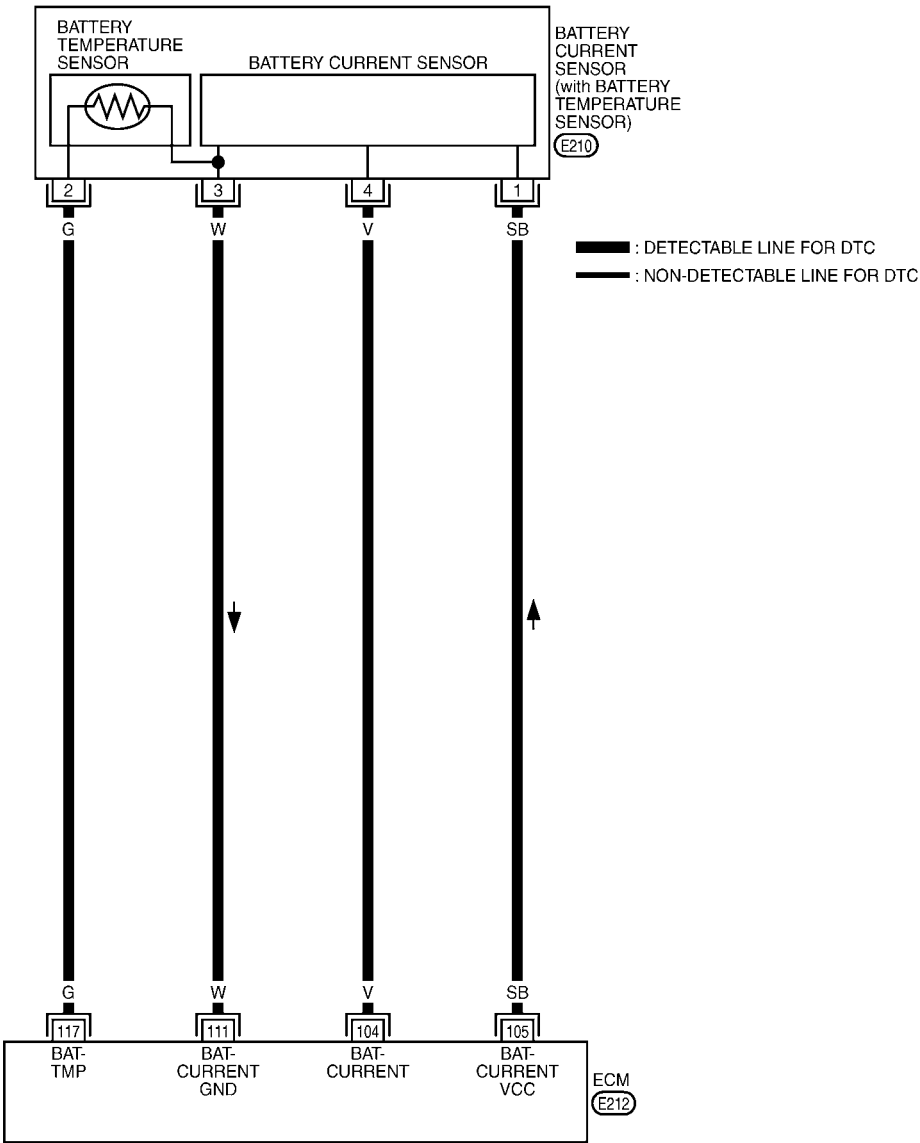
< WIRING DIAGRAM >

[YD25DDTi]

Wiring Diagram - CUR/SE -

INFOID:000000006106778

EC-CUR/SE-01



JMBWA0411GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

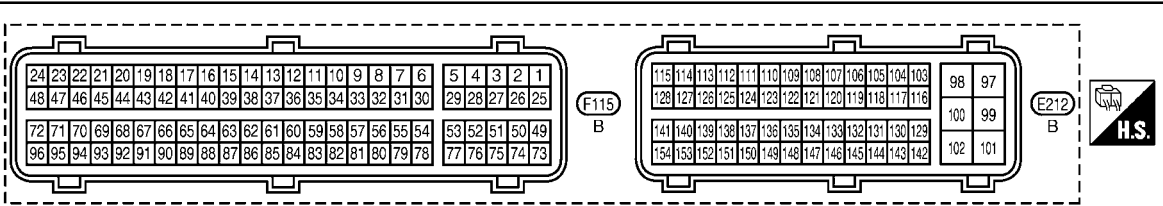
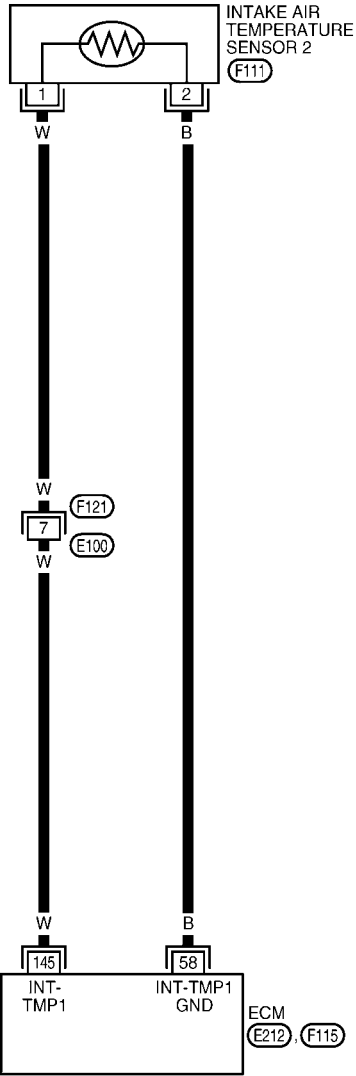
[YD25DDTi]

Wiring Diagram - INTEMP2 -

INFOID:000000006106779

EC-INTMP2-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0412GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

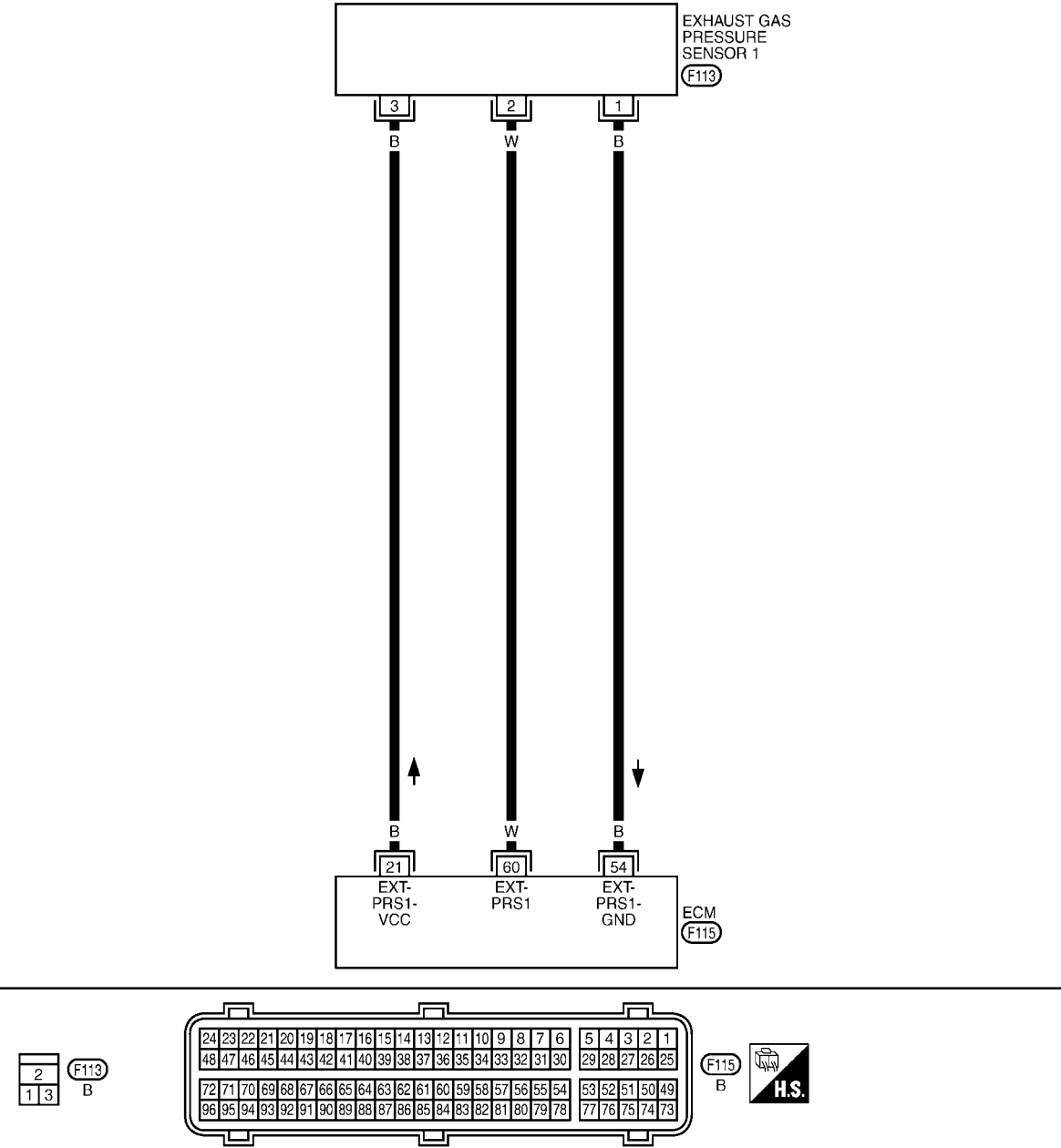
[YD25DDTi]

Wiring Diagram - EXPRES -

INFOID:000000006106780

EC-EXPRES-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



JMBWA0413GB

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[YD25DDTi]

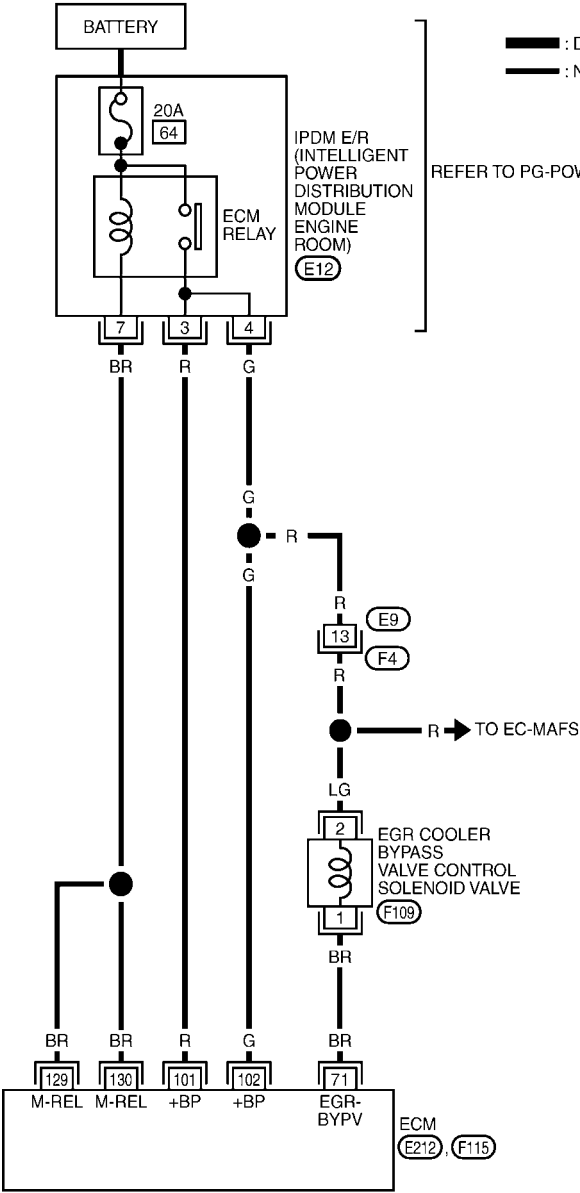
Wiring Diagram - BYPASS -

INFOID:000000006106781

EC-BYPASS-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC

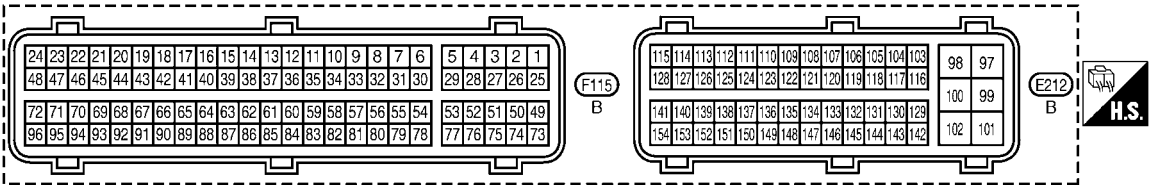
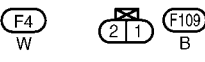
REFER TO PG-POWER.



9	8	7	6	5	4	3
18	17	16	15	14	13	12



1	2	3	4	5	6	7
8	9	10	11	12	13	14



JMBWA0414GB

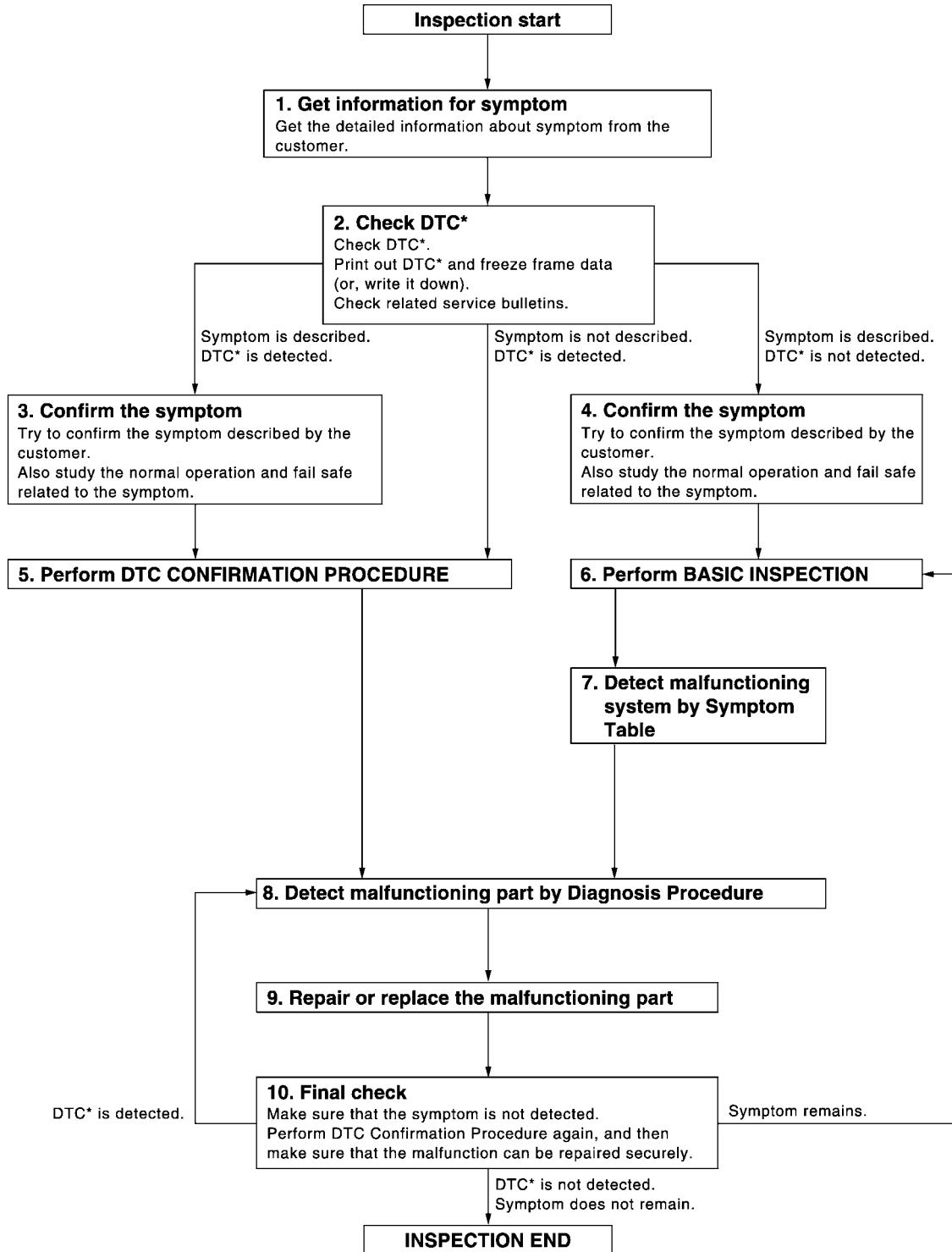
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000006106782

OVERALL SEQUENCE



*: Include 1st/2nd trip DTC.

JMBIA1206GB

DETAILED FLOW

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[YD25DDTi]

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to [EC-1034, "Diagnostic Work Sheet"](#).)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
 - Erase DTC. (Refer to [EC-941, "Diagnosis Description"](#).)
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-1210, "Symptom Table"](#).)
3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation related to the symptom. Refer to [EC-1215, "Description"](#).

Diagnostic Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation related to the symptom.

Diagnostic Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to [EC-967, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
 - If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 8.

NO >> Check according to [EC-1038, "Description"](#).

6.PERFORM BASIC INSPECTION

Perform [EC-1036, "Work Procedure"](#).

>> GO TO 7.

DIAGNOSIS AND REPAIR WORK FLOW

[YD25DDTi]

< BASIC INSPECTION >

7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-1210, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 8.

8.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure.

Is malfunctioning part detected?

YES >> GO TO 9.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC-954, "Reference Value"](#).

9.REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to [EC-941, "Diagnosis Description"](#).

>> GO TO 10.

10.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 8.

YES-2 >> Symptom remains: GO TO 6.

NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to [EC-941, "Diagnosis Description"](#).)

Diagnostic Work Sheet

INFOID:000000006106783

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

SEF907L

[YD25DDTi]

BASIC INSPECTION

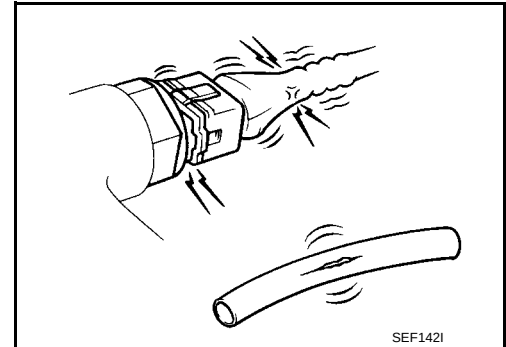
Work Procedure

INFOID:000000006106784

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to [MA-7, "YD25DDTi : Periodic Maintenance"](#).
3. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Vacuum hoses for splits, kinks, or improper connections
 - Wiring for improper connections, pinches, or cuts
4. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
5. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.



2.CHECK IDLE SPEED

Check idle speed.

For procedure, refer to [EC-1216, "Inspection"](#).

For specification, refer to [EC-1221, "General Specification"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to [MA-44, "Air Bleeding"](#).

>> GO TO 5.

5.CHECK IDLE SPEED AGAIN

1. Start engine.
2. Check idle speed.
 - For procedure, refer to [EC-1216, "Inspection"](#).
 - For specification, refer to [EC-1221, "General Specification"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to [MA-44, "Draining Water from Fuel Filter"](#).

>> GO TO 7.

BASIC INSPECTION

[YD25DDTi]

< BASIC INSPECTION >

7.CHECK IDLE SPEED AGAIN

1. Start engine.
2. Check idle speed.
For procedure, refer to [EC-1216, "Inspection"](#).
For specification, refer to [EC-1221, "General Specification"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 8.

8.CHECK AIR CLEANER FILTER

1. Stop engine.
2. Check air cleaner filter for clogging or breaks.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace air cleaner filter.

9.CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 10.

10.CHECK BATTERY

Refer to [SC-5, "Battery Test and Charging Chart"](#).

Is the inspection result normal?

- YES >> Check charging system. Refer to [SC-18, "Trouble Diagnosis"](#).
NO >> Repair or replace.

11.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-271, "Standard and Limit"](#).

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Follow the instruction of "CHECKING COMPRESSION PRESSURE".

12.CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1216, "Inspection"](#).
For specification, refer to [EC-1221, "General Specification"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Check fuel injector. Refer to [EC-1193, "Diagnosis Procedure"](#). And then, GO TO 2.

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< BASIC INSPECTION >

[YD25DDTi]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000006106785

Intermittent incidents may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st/2nd trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON INTERMITTENT INCIDENTS REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT is used. The SELF-DIAG RESULTS screen shows time data other than "0".
III	The symptom described by the customer does not recur.
IV	(1st/2nd trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:000000006106786

1.INSPECTION START

Erase (1st/2nd trip) DTCs. Refer to [EC-941, "Diagnosis Description"](#).

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to [PG-36, "Ground Distribution"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Repair or replace.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[YD25DDTi]

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:000000006106787

When replacing ECM, this procedure must be performed.

EC

Work Procedure

INFOID:000000006106788

1.PERFORM PROGRAMMING

Refer to "CONSULT Operation Manual".

>> GO TO 2.

2.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Perform initialization of NATS system and registration of all NATS ignition key IDs.

>> GO TO 3.

3.PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform injector adjustment value registration. Refer to [EC-1040, "Work Procedure"](#).

>> GO TO 4.

4.PERFORM FUEL INJECTOR QUANTITY LEARNING

Perform fuel injector quantity learning. Refer to [EC-1041, "Work Procedure"](#).

>> GO TO 5.

5.PERFORM FUEL PUMP LEARNING VALUE CLEARING

Perform fuel pump learning value clearing. Refer to [EC-1043, "Work Procedure"](#).

>> GO TO 6.

6.PERFORM EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

Perform EGR volume control valve closed position learning value clear. Refer to [EC-1044, "Work Procedure"](#).

>> GO TO 7.

7.PERFORM EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Perform EGR volume control valve closed position learning. Refer to [EC-1043, "Work Procedure"](#).

>> GO TO 8.

8.PERFORM ASCD SYSTEM RECOGNITION

1. Turn ignition switch ON.
2. Push the ASCD main switch.

>> END

INJECTOR ADJUSTMENT VALUE REGISTRATION

< BASIC INSPECTION >

[YD25DDTi]

INJECTOR ADJUSTMENT VALUE REGISTRATION

Description

INFOID:000000006106789

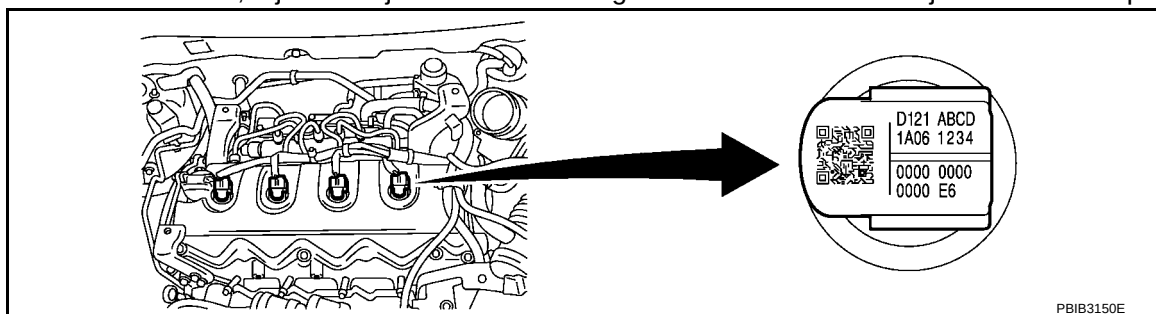
Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector adjustment value registration must be performed after the following cases.

- Injector(s) are replaced.
- ECM is replaced.

For the first case, Injector Adjustment Value Registration for the replaced fuel injector must be performed. And for the second case, Injector Adjustment Value Registration for all the fuel injectors must be performed.



Example: Injector adjustment value = D121ABCD1A061234000000000000E6

Work Procedure

INFOID:000000006106790

1. START

NOTE:

- Before performing this procedure, record injector adjustment value printed on a fuel injector.
- When all fuel injectors are replaced or ECM is replaced, it is recommended to perform "INJ ADJ VAL CLR" in "WORK SUPPORT" mode before performing this procedure. By performing "INJ ADJ VAL CLR" in "WORK SUPPORT" mode, injector adjustment value stored in ECM is initialized.

1. Turn ignition switch ON (engine stopped).
2. Select "ENTER INJECTOR CALIB DATA" in "WORK SUPPORT" mode with CONSULT.
3. Touch "START".

NOTE:

When touching "START", CONSULT reads injector adjustment values stored in ECM.

4. Select the number of the cylinder which needs injector adjustment value registration.
5. Input injector adjustment value, and touch "ENTER".

NOTE:

Input injector adjustment value is stored in CONSULT.

6. Repeat step 4 - 5 till there is no cylinder which needs injector adjustment value registration, and touch "START".

NOTE:

When touching "START", injector adjustment values stored in CONSULT are written onto ECM memory.

7. After "CMND FINISHED" is displayed, make sure that the following values are same for each cylinder.
 - Injector adjustment value which is printed on a fuel injector.
 - Injector adjustment value which is displayed on CONSULT screen.

NOTE:

- In this step, CONSULT reads injector adjustment values stored in ECM and displays the values on the CONSULT screen. This is for checking if injector adjustment values are written onto ECM memory correctly.
- If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.

>> END

FUEL INJECTION QUANTITY LEARNING

Description

INFOID:000000006106791

DESCRIPTION

Fuel injection quantity learning is performed to adjust fuel injection quantity deviated during the use of injectors under various conditions to properly adjust the injection quantity. If this learning is not performed, then malfunctions, such as knocking and poor acceleration may occur.

Injector fuel injection quantity learning must be performed after the following cases.

NOTE:

If the learning is performed at high altitudes (atmospheric pressure is low), there is the case the learning does not complete. In this case, perform learning value clear only. The clear function is in the fuel injection quantity learning function.

- Injector(s) are replaced.

NOTE:

- If all injectors are replaced, then perform learning value clear only. The clear function is in the fuel injection quantity learning function.
- ECM is replaced.
- ECM detected some DTC. (After work completion)

ERROR LIST

If errors listed below are indicated, diagnose and eliminate possible causes before restarting the learning.

Detection	detecting condition
CONDITION ARE NOT SATISFIED	Learning permission conditions are not satisfied. Refer to EC-1041. "Work Procedure" .
BOOST PRESSURE ERROR	Error in boost pressure
INTAKE AIR TEMPERATURE ERROR	Error in intake air pressure
ENGINE SPEED ERROR	While engine speed is unstable
FUEL RAIL PRESSURE ERROR	Actual rail pressure is extremely deviated from the target rail pressure
CYLINDER XX LEARNING NOT SUCCEEDED	Learning of Cylinder XX is unsuccessful NOTE: When this error message is shown, perform the learning again. If an error is detected in the same cylinder, perform EC-1193. "Diagnosis Procedure".

Work Procedure

INFOID:000000006106792

1. ERASE FUEL INJECTION QUANTITY LEARNING VALUE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON (engine stopped).
3. Select "FUEL INJ QUANTITY LEARNING" in "WORK SUPPORT" mode with CONSULT.
4. Touch "START".

NOTE:

When touching "START", CONSULT erases fuel injection quantity learning value stored in ECM.

Is this work after replacing all fuel injectors?

- YES >> Touch "END".
 NO >> GO TO 2.

2. VEHICLE CONDITION CHECK

1. Start the engine and warm it up to the normal operating temperature.
2. Check that the vehicle is in the following conditions.

Engine speed	At idle
Vehicle speed	0 km/h (0 MPH)
DTC	Not detected
Engine coolant temperature	70°C (158°F) or more
Fuel temperature	Between 20°C (68°F) and 60°C (140°F)

FUEL INJECTION QUANTITY LEARNING

[YD25DDTi]

< BASIC INSPECTION >

Intake air temperature	–15°C (–59°F) or more
Gear position	N (or P)
Brake pedal	Released
Accelerator pedal	Released
Electrical load	OFF

3. Open the engine hood.

4. Touch "START".

NOTE:

When touching "START", CONSULT automatically checks the vehicle condition to evaluate the feasibility of the learning.

Is an error message displayed?

YES >> Check the error. Refer to [EC-1041, "Description"](#).

NO >> GO TO 3.

3. START FUEL INJECTION QUANTITY LEARNING

1. Touch "NEXT".

CAUTION:

Ensure the safety before starting fuel injection quantity learning. Engine speed increases to around 3,500 rpm after touching "NEXT".

2. Let stand until the learning completes.

NOTE:

Learning time is approximately 8 to 30 minutes.

3. Check the completion message.

Is "COMPLETE" displayed?

YES >> END

NO >> Touch "NEXT" and check the error. Refer to [EC-1041, "Description"](#).

FUEL PUMP LEARNING VALUE CLEARING

< BASIC INSPECTION >

[YD25DDTi]

FUEL PUMP LEARNING VALUE CLEARING

Description

INFOID:000000006106793

In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.

Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operation to clear the value of the fuel pump learning.

Fuel Pump Learning Value Clearing should be performed under the following conditions.

- Fuel pump is changed.
- ECM is replaced with used one which stores the fuel pump learning value of other fuel pump.

Work Procedure

INFOID:000000006106794

NOTE:

When removing fuel pump, perform Fuel Pump Learning Value Clearing before starting the engine.

1. FUEL PUMP LEARNING VALUE CLEAR

With CONSULT

1. Turn ignition switch ON.
2. Select "PUMP LEARNT CLEAR" in "ACTIVE TEST" mode with CONSULT.
3. Touch "CLEAR" and wait a few seconds.
4. Check that "CMPLT" is displayed on CONSULT screen.

Without CONSULT

Fuel pump learning value can be erased from the back up memory in the ECM by the same operation as erasing DTC. In detail, refer to [EC-941, "Diagnosis Description"](#).

>> WORK END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

< BASIC INSPECTION >

[YD25DDTi]

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

Description

INFOID:000000006106795

“EGR Volume Control Valve Closed Position Learning Value Clear” should be cleared under the following cases.

- EGR volume control valve is removed.
- EGR volume control valve is replaced.

Work Procedure

INFOID:000000006106796

1.START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “EGR/V LEARN CLR” in “WORK SUPPORT” mode with CONSULT.
5. Touch “CLEAR” and wait a few seconds.
6. Make sure the “CMPLT” is displayed on CONSULT screen.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[YD25DDTi]

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Description

INFOID:000000006106797

“EGR Volume Control Valve Closed Position Learning” is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve position sensor output signal. It must be performed under any of the following conditions:

- EGR volume control valve is removed.
- EGR volume control valve is replaced.
- ECM is replaced.

Work Procedure

INFOID:000000006106798

1.START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 30 seconds.
Make sure that EGR volume control valve moves during above 30 seconds by confirming the operating sound.

>> END

DTC/CIRCUIT DIAGNOSIS**POWER SUPPLY AND GROUND CIRCUIT****Diagnosis Procedure**

INFOID:000000006106799

1.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
IPDM E/R	#64	20A
J/B	#1	10A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> GO TO 2.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21, E41, E61 and E213. Refer to Ground Inspection in [PG-36, "Ground Distribution"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK ECM GROUND CIRCUIT FOR OPEN

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit in harness or connectors.

4.CHECK ECM POWER SUPPLY CIRCUIT (BATT)

1. Reconnect ECM harness connector.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E212	142	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK ECM POWER SUPPLY CIRCUIT (BATT) FOR OPEN

1. Disconnect ECM harness connector and IPDM E/R harness connector.
2. Check the continuity between ECM harness connector and IPDM E/R harness connector.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E212	142	E13	30	Existed

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair open circuit or short to power in harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT (IGN)

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E212	143	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT (IGN) FOR OPEN

1. Disconnect ECM harness connector and fuse block (J/B) harness connector.
2. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
E212	143	M88	15A	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> Check power supply routing circuit for ignition power supply. Refer to [PG-5. "EXCEPT FOR V9X ENGINE MODELS : Wiring Diagram - POWER -"](#).

NO >> Repair open circuit or short to power in harness or connectors.

U1000 CAN COMM CIRCUIT

Description

INFOID:000000006106800

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000006106801

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1000	CAN COMM CIRCUIT (CAN communication line)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1048, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106802

Perform the trouble diagnosis for CAN communication system. Refer to [LAN-46, "CAN System Specification Chart"](#).

U1025 ENG COMMUNICATION

Description

INFOID:000000006106803

ENG communication is a serial communication line for real time application. It is a multiplex communication line with high data communication speed and excellent error detection ability. ECM and turbocharger boost control actuator are connected with two communication lines (ENG communication H-line and ENG communication L-line) and transmit/receive data. ECM shares information and links with the turbocharger boost control actuator during operation.

DTC Logic

INFOID:000000006106804

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1025	TC BOOST COMM LINE (ENG communication)	- ECM cannot receive ENG communication signal for approx. 50 msec. or more. - Turbocharger boost control actuator cannot receive ENG communication signal for 0.2 seconds or more.	- Harness or connectors (ENG communication line is open or shorted) - Turbocharger boost control actuator - ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is DTC detected?

YES >> Proceed to [EC-1049, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106805

1.CHECK TC BOOST CONTROL ACTUATOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect TC boost control actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between TC boost control actuator harness connector terminals.

TC boost control actuator			Voltage
Connector	+	-	
	Terminal		
F101	1	2	Battery voltage

Is inspection result normal?

YES >> GO TO 5.
 NO >> GO TO 2.

2.CHECK TC BOOST CONTROL ACTUATOR POWER SUPPLY-II

Check the voltage between TC boost control actuator harness connector and ground.

+		−	Voltage
TC boost control actuator			
Connector	Terminal		
F101	1	Ground	Battery voltage

Is inspection result normal?

YES >> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.CHECK TC BOOST CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between TC boost control actuator harness connector and IPDM E/R harness connector.

+		-		Continuity
TC boost control actuator		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F101	1	E12	4	Existed

4. Also check the harness short to ground.

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
 NO >> Repair or replace error-detected parts.

4.CHECK TC BOOST CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between TC boost control actuator harness connector and ground.

+		-	Continuity
TC boost control actuator			
Connector	Terminal		
F101	2	Ground	Existed

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
 NO >> Repair or replace error-detected parts.

5.CHECK ECM COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and TC boost control actuator harness connector.

ECM		TC boost control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E212	134	F101	3	Existed
	135		5	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is inspection result normal?

- YES >> GO TO 7.
 NO >> Repair or replace error-detected parts.

7.REPLACE TC BOOST CONTROL ACTUATOR

1. Replace turbocharger assembly. Refer to [EM-168, "Removal and Installation"](#).
2. Perform confirmation procedure. Refer to [EC-1049, "DTC Logic"](#).

U1025 ENG COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Is the DTC U1025 detected again?

YES >> GO TO 8.

NO >> INSPECTION END

8.REPLACE ECM

Replace ECM. Refer to [EC-1218. "Removal and Installation"](#).

>> INSPECTION END

A

EC

C

D

E

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H

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M

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O

P

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:000000006106806

DTC DETECTION LOGIC

NOTE:

If DTC P0016 is displayed with DTC P0652 or P0653, perform trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0016	CMP/CKP RELATION (Crankshaft position - camshaft position correlation)	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	• Camshaft position sensor • Crankshaft position sensor • Timing chain • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.

NOTE:

If the engine does not start, keep ignition switch at START position for at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1052, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106807

1.CHECK CAMSHAFT POSITION SENSOR

Check camshaft position sensor. Refer to [EC-1053, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor.

2.CHECK CRANKSHAFT POSITION SENSOR

Check crankshaft position sensor. Refer to [EC-1053, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace crankshaft position sensor.

3.CHECK TIMING CHAIN

Check timing chain. Refer to [EM-220, "Removal and Installation"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace timing chain.

4.CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Remove debris and clean the signal plate or replace sprocket.

5.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).
NO >> Replace signal plate.

Component Inspection (Crankshaft Position Sensor)

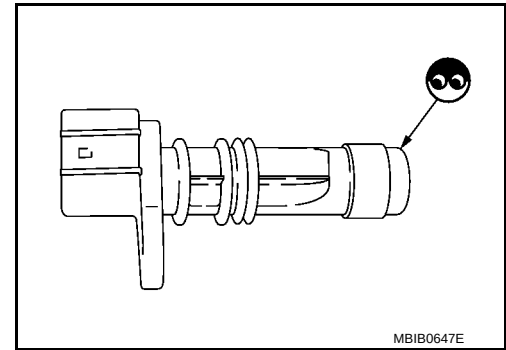
INFOID:000000006106808

1.VISUALLY CHECK

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace crankshaft position sensor.



2.CHECK RESISTANCE

Check resistance between crankshaft position sensor terminal.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace crankshaft position sensor.

Component Inspection (Camshaft Position Sensor)

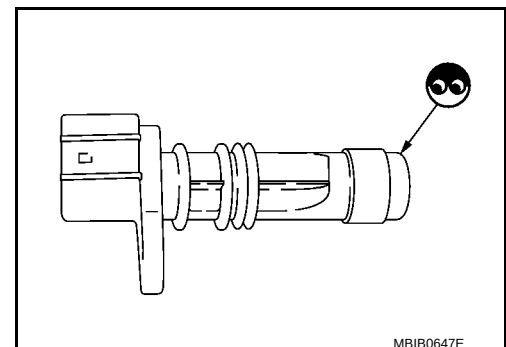
INFOID:000000006106809

1.VISUALLY CHECK

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace camshaft position sensor.



2.CHECK RESISTANCE

P0016 CKP - CMP CORRELATION

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Check the resistance between camshaft position sensor terminal as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor.

P0088 FUEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0088 FUEL SYSTEM

DTC Logic

INFOID:000000006106810

DTC DETECTION LOGIC

NOTE:

If DTC P0088 is displayed with DTC P0652, P0653, perform the trouble diagnosis for DTC P0652, P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0088	HIGH FUEL PRESS (Fuel rail pressure too high)	Fuel pressure is too much higher than the specified value.	- Fuel pump - Fuel pump suction control valve - Fuel injector - Fuel rail pressure sensor - Air mixed with fuel

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and warm it up to normal operating temperature.
- Keep engine speed more than 2,000 rpm for at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1055, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007084986

1. CHECK AIR MIXED WITH FUEL

Check the fuel filter condition. Refer to [MA-7, "YD25DDTi : Periodic Maintenance"](#).

Is fuel filter maintenance according to the manual?

- YES >> Perform air-bleeding from fuel line. Refer to [FL-17, "Air Bleeding"](#). And then, GO TO 2.
NO >> Maintenance fuel filter.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT

- Turn ignition switch ON.
- Perform "Fuel Pump Learning Value Clearing". Refer to [EC-1043, "Work Procedure"](#).
- Start engine and let it idle for at least 60 seconds.
- Select "SELF-DIAG RESULT" mode with CONSULT.
- Touch "ERASE".
- Perform DTC confirmation procedure, again. Refer to [EC-1055, "DTC Logic"](#).
- Check DTC.

Without CONSULT

- Turn ignition switch ON.
- Perform Fuel Pump Learning Value Clearing. Refer to [EC-1043, "Work Procedure"](#).
- Start engine and let it idle for at least 60 seconds.
- Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
- Perform DTC confirmation procedure, again. Refer to [EC-1043, "Work Procedure"](#).

< DTC/CIRCUIT DIAGNOSIS >

6. Check DTC.

Is 1st trip DTC displayed again?

YES >> GO TO 3.

NO >> **INSPECTION END**

3.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1056, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

4.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1057, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

5.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1056, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-181, "Exploded View"](#).

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)

NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106812

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

Connector	ECM		Condition	Voltage
	+	-		
	Terminal	Terminal		
F115	40	16	Idle	1.4 – 1.7 V
	(Fuel rail pressure sensor signal)		2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

Component Inspection (Fuel Injector)

INFOID:000000006106813

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

P0088 FUEL SYSTEM

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Terminal	Resistance
1 and 2	0.2 - 0.8 Ω [at 10 – 60°C (50 – 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-181, "Exploded View"](#).

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084908

1. CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

P0089 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0089 FUEL PUMP

DTC Logic

INFOID:000000006106815

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0089	FUEL PUMP (Fuel pump performance)	Fuel pressure is too much higher than the target value.	- Fuel pump - Fuel pump suction control valve - Air mixed with fuel - Lack of fuel - Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 30 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1058, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007084988

1.CHECK AIR MIXED WITH FUEL

Check the fuel filter condition. Refer to [MA-7, "YD25DDTi : Periodic Maintenance"](#).

Is fuel filter maintenance according to the manual?

YES >> Perform air-bleeding from fuel line. Refer to [FL-17, "Air Bleeding"](#). And then, GO TO 2.
NO >> Replace fuel filter. Refer to [FL-16, "Removal and Installation"](#).

2.PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT

1. Turn ignition switch ON.
2. Perform "Fuel Pump Learning Value Clearing". Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.
4. Select "SELF-DIAG RESULT" mode with CONSULT.
5. Touch "ERASE".
6. Perform DTC confirmation procedure, again. Refer to [EC-1058, "DTC Logic"](#).

Without CONSULT

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
5. Perform DTC confirmation procedure, again. Refer to [EC-1058, "DTC Logic"](#).

Is 1st trip DTC displayed again?

YES >> GO TO 3.
NO >> INSPECTION END

P0089 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

3.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1059, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).
Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

4.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1059, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

5.REPLACE SUCTION CONTROL VALVE OF FUEL PUMP

1. Replace suction control valve of fuel pump.
2. Perform fuel pump learning value clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Perform DTC confirmation procedure. Refer to [EC-1058, "DTC Logic"](#).

Is 1st DTC detected?

YES >> GO TO 6.

NO >> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)

NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106817

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	40 (Fuel rail pressure sensor signal)	16	Idle	1.4 – 1.7 V
			2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail.

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084990

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

P0089 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

P0093 FUEL SYSTEM

DTC Logic

INFOID:000000006106819

DTC DETECTION LOGIC

NOTE:

If DTC P0093 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0093	FUEL LEAK (Fuel system leak)	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	- Fuel pump - Fuel pump suction control valve - Fuel rail - Fuel pipe - Fuel rail pressure relief valve - Air mixed with fuel - Lack of fuel

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Check the overall function of the fuel system. Perform [EC-1061, "Component Function Check"](#).

NOTE:

Use this procedure to check the overall function of the fuel system. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000006106820

1.PERFORM COMPONENT FUNCTION CHECK-I**WARNING:**

- Make sure that there is no fire hazard near the vehicle.
 - Before performing the following procedure, cool down engine.
- Open engine hood and check if there are any signs of fuel leakage or not.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

2.PERFORM COMPONENT FUNCTION CHECK-II

Check oil level.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

3.PERFORM COMPONENT FUNCTION CHECK-III

Start engine and check fuel leakage in the engine room.

Is the inspection result normal?

YES-1 >> WITH CONSULT: GO TO 4.

YES-2 >> WITH GST: GO TO 5.

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

4.PERFORM COMPONENT FUNCTION CHECK-IV

 With CONSULT

1. Select "ACT CR PRESS" in "DATA MONITOR" mode with CONSULT
2. Check the display of the idle speed.

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition	Indication
ACT CR PRESS	Idle	25 - 35 MPa

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

5.PERFORM COMPONENT FUNCTION CHECK-IV

 With GST

1. Select Service \$1 mode with GST
2. Check the display of the idle speed.

Monitor item	Condition	Indication
Fuel rail pressure	Idle	25 - 35 MPa

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1062, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000007085187

1.CHECK AIR MIXED WITH FUEL

Check the fuel filter condition. Refer to [MA-7, "YD25DDTi : Periodic Maintenance"](#).

Is fuel filter maintenance according to the manual?

YES >> Perform air-bleeding from fuel line. Refer to [FL-17, "Air Bleeding"](#). And then, GO TO 2.

NO >> Replace fuel filter. Refer to [FL-16, "Removal and Installation"](#).

2.PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

 With CONSULT

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.
4. Select "SELF-DIAG RESULT" mode with CONSULT.
5. Touch "ERASE".
6. Perform [EC-1061, "Component Function Check"](#), again.

 Without CONSULT

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
5. Perform [EC-1061, "Component Function Check"](#), again.

Is DTC displayed again?

YES >> GO TO 3.

NO >> **INSPECTION END**

3.CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.
 - Fuel tube from fuel pump to fuel rail
 - Fuel rail
 - Fuel tube from fuel rail to fuel injector
3. Also check for improper connection or pinches.

Is the inspection result normal?

YES >> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair malfunctioning part.

4.CHECK FUEL RAIL PRESSURE RELIEF VALVE

Check fuel rail pressure relief valve. Refer to [EC-1063, "Component Inspection \(Fuel Rail Pressure Relief Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.REPLACE SUCTION CONTROL VALVE OF FUEL PUMP

1. Replace suction control valve of fuel pump. Refer to [EM-193, "Component"](#).

2. Perform fuel pump learning value clearing. Refer to [EC-1043, "Work Procedure"](#).

3. Perform DTC confirmation procedure. Refer to [EC-1061, "DTC Logic"](#).

Is 1st DTC detected?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#).

NO >> INSPECTION END

Component Inspection (Fuel Rail Pressure Relief Valve)

INFOID:000000006106822

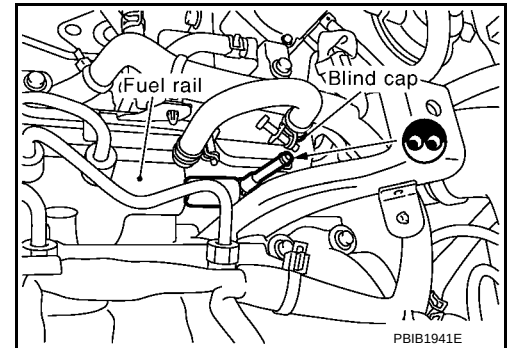
WARNING:

- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.

1.CHECK FUEL RAIL PRESSURE RELIEF VALVE

ⓂWith CONSULT

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.
5. Select "PRES REGULATOR" in "ACTIVE TEST MODE" with CONSULT.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching "UP" or "Qu" on the CONSULT screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

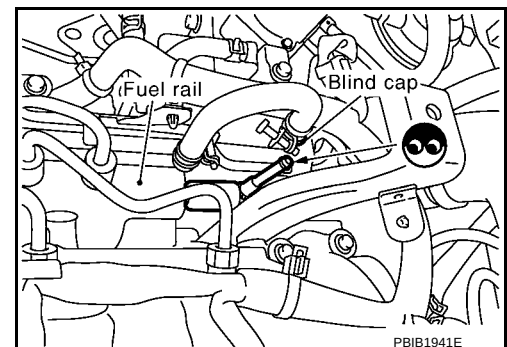


WARNING:

- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

ⓍWithout CONSULT

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

P0093 FUEL SYSTEM

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail.

P0097, P0098 IAT SENSOR 2

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

P0097, P0098 IAT SENSOR 2

DTC Logic

INFOID:000000006106823

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0097	IAT SENSOR 2 B1 (IAT sensor 2 circuit low input)	Signal voltage from IAT sensor 2 remains 0.1V or less for 2 seconds or more	• Harness or connectors (IAT sensor 2 circuit is open or shorted.) • IAT sensor 2
P0098	IAT SENSOR 2 B1 (IAT sensor 2 circuit high input)	Signal voltage from IAT sensor 2 remains 4.95V or more for 2 seconds or more	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1065, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106824

1. CHECK IAT SENSOR 2 POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect IAT sensor 2 connector.
3. Turn ignition switch ON.
4. Check the voltage between IAT sensor 2 harness connector terminals.

IAT sensor 2			Voltage (Approx.)
Connector	+	-	
	terminal		
F111	1	2	5 V

Inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK IAT SENSOR 2 POWER SUPPLY-II

Check the voltage between IAT sensor 2 harness connector and ground.

+		-	Voltage (Approx.)
IAT sensor 2			
Connector	Terminal		
F111	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

P0097, P0098 IAT SENSOR 2

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.CHECK IAT SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between IAT sensor 2 harness connector and ECM harness connector.

+		-		Continuity
IAT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F111	1	E212	145	Existed

4. Also check harness for short to ground.

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK IAT SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between IAT sensor 2 harness connector and ECM harness connector.

+		-		Continuity
IAT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F111	2	F115	58	Existed

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace error-detected parts.

6.CHECK IAT SENSOR 2

Refer to [EC-1067, "Component Inspection \(IAT sensor 2\)"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace IAT sensor 2.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (IAT sensor 2)

INFOID:000000006106825

1. CHECK IAT SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect IAT sensor 2 harness connector.
3. Check the resistance between IAT sensor 2 connector terminals.

+	−	Condition	Resistance (kΩ)
IAT sensor 2			
Terminal			
1	2	Temperature: 20°C (68°F)	2.438 – 2.588
		Temperature: 80°C (176°F)	0.312 – 0.346

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace IAT sensor 2.

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P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0101 MAF SENSOR

DTC Logic

INFOID:000000006106826

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SENSOR (Mass air flow sensor circuit range/performance)	Improper voltage from the sensor is sent to ECM compared with the driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • Intake air leaks • Air cleaner • Intake air temperature sensor • EGR volume control valve • Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and let it idle for at least 40 seconds.
3. Drive the vehicle under the following condition.

Engine speed	Approx. 2,800 rpm
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
Shift lever	4th position

4. Release accelerator pedal for at least 10 seconds.
NOTE:
Do not depress brake pedal during this procedure.
5. Stop the vehicle.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Check self-diagnostic results with ECM.

Is 1st trip DTC displayed?

- YES >> Proceed to [EC-1068, "Diagnosis Procedure"](#)
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106827

1. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Reconnect the parts.

2. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F23	5	Ground	Battery voltage

P0101 MAF SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	4	E212	112	Existed

4. Also check harness for short to ground and short power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	3	E212	125	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor. Refer to [EC-1070, "Component Inspection \(Intake Air Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6

NO >> Replace mass air flow sensor (with intake air temperature sensor).

6.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1070, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace turbocharger boost sensor.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to [EC-1070, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace mass air flow sensor.

8.CHECK EGR VOLUME CONTROL VALVE FUNCTION

Check EGR volume control valve and its circuit. Refer to [EC-1104, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace malfunctioning part.

P0101 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (Intake Air Temperature Sensor)

INFOID:000000006106828

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance
1 and 2	Temperature	25°C (77°F)	2.003 - 2.127 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor).

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000006106829

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Remove turbocharger boost sensor with its harness connected.
4. Use pump to apply pressure to sensor.

NOTE:

- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

5. Check the voltage between ECM harness connector.

ECM			Condition (pressure gauge)	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	48 (Turbocharger boost sensor signal)	55	0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approx. 2.3 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	Approx. 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor.

Component Inspection (Mass Air Flow Sensor)

INFOID:000000006106830

1.CHECK MASS AIR FLOW SENSOR

 With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MAS AIR/FL SE" and check indication under the following conditions.

Data monitor item	Condition	Voltage
MAS AIR/FL SE	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 4.0 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

 Without CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.

P0101 MAF SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as par the following conditions.

(+) (V)		(-) (V)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E212	125 (MAF sensor signal)	E212	112	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
				Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 4.0 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace mass air flow sensor.

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:000000006106831

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT (Mass air flow sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
P0103	MAF SEN/CIRCUIT (Mass air flow sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1072, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1072, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106832

1. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F23	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	4	E212	112	Existed

4. Also check harness for short to ground and short power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	3	E212	125	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to [EC-1073, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace mass air flow sensor. Refer to [EM-157, "Component"](#)

Component Inspection (Mass Air Flow Sensor)

INFOID:000000006106833

1.CHECK MASS AIR FLOW SENSOR

④ With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MAS AIR/FL SE" and check indication under the following conditions.

Data monitor item	Condition	Voltage
MAS AIR/FL SE	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
	Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 4.0 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

④ Without CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as par the following conditions.

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

(+)		(-)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E212	125 (MAF sensor signal)	E212	112	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.3 V
				Idle to about 4,000 rpm	0.8 - 1.3 V to Approx. 4.0 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor.

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0112, P0113 IAT SENSOR

DTC Logic

INFOID:000000006106834

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT (Intake air temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	IAT SEN/CIRCUIT (Intake air temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1075, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106835

1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
F23	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness to connectors.

2. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	1	F115	14	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness to connectors.

P0112, P0113 IAT SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

3.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-1070, "Component Inspection \(Intake Air Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to [EM-157, "Component"](#).

Component Inspection (Intake Air Temperature Sensor)

INFOID:0000000006106836

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance
1 and 2	Temperature	25°C (77°F)	2.003 - 2.127 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:000000006106837

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0117	ECT SEN/CIRCUIT (Engine coolant temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	ECT SEN/CIRCUIT (Engine coolant temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1077, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106838

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between engine coolant temperature sensor harness connector and ground.

Engine coolant temperature sensor		Ground	voltage
Connector	Terminal		
F12	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F115	15	Existed

4. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 3.

P0117, P0118 ECT SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair open circuit or short to ground or short to power in harness or connectors

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to [EC-1078, "Component Inspection \(Engine Coolant Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace engine coolant temperature sensor.

Component Inspection (Engine Coolant Temperature Sensor)

INFOID:000000006106839

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

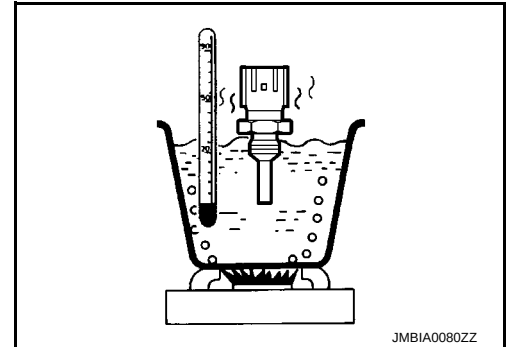
1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68) 2.1 - 2.9
		50 (122) 0.68 - 1.00
		90 (194) 0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



P0122, P0123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0122, P0123 APP SENSOR

DTC Logic

INFOID:000000006106840

DTC DETECTION LOGIC

NOTE:

If DTC P0120 is displayed with DTC P0642, P0643, perform the trouble diagnosis for DTC P0642, P0643. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0122	APP SEN 1/CIRCUIT (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to ECM.	- Harness or connectors (The APP sensor 1 circuit is open or shorted.) - Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123	APP SEN 1/CIRCUIT (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1079, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106841

1. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E108	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	4	E212	108	Existed

- Also check harness for short to ground and short to power.

P0122, P0123 APP SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	3	E212	107	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR

Check accelerator pedal assembly. Refer to [EC-1080, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace accelerator pedal assembly.

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006106842

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector.

(+) (V)		(-)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E212	107 (APP sensor 1 signal)	E212	108	Accelerator pedal	Fully released	0.65 - 0.87 V
					Fully depressed	More than 4.3 V
E212	120 (APP sensor 2 signal)	E212	121	Accelerator pedal	Fully released	0.28 - 0.48 V
					Fully depressed	More than 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly.

P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

DTC Logic

INFOID:000000006106843

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FUEL TEMP SEN/CIRC (Fuel pump temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel pump temperature sensor
P0183	FUEL TEMP SEN/CIRC (Fuel pump temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1081, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106844

1. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check voltage between fuel pump temperature sensor harness connector and ground.

Fuel pump temperature sensor		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel pump temperature sensor harness connector and ECM harness connector.

Fuel pump temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F115	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#).

NO >> Repair or replace malfunctioning part.

P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0192, P0193 FRP SENSOR

DTC Logic

INFOID:000000006106845

DTC DETECTION LOGIC

NOTE:

If DTC P0192 or P0193 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0192	FRP SEN/CIRC (Fuel rail pressure sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel rail pressure sensor
P0193	FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1083, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106846

1. CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F11	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F11	3	F115	16	Existed

4. Also check harness for short to ground and short to power.

P0192, P0193 FRP SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F11	2	F115	40	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1056, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#)

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106847

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	40	16	Idle	1.4 – 1.7 V
	(Fuel rail pressure sensor signal)		2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

P0200 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0200 FUEL INJECTOR

Description

INFOID:000000006106848

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

DTC Logic

INFOID:000000006106849

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0200	INJECTOR (Fuel injector power supply circuit)	ECM detects a voltage of internal power source circuit for the fuel injector is excessively high or low.	ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION

Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1085, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106850

1. INSPECTION START

1. Turn ignition switch ON.
2. Erase self diag results of ECM.
3. Perform DTC confirmation procedure, again.

Is DTC P0200 displayed again?

- YES >> Replace ECM. [EC-1218, "Removal and Installation"](#).
NO >> INSPECTION END

P0201, P0202, P0203, P0204 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:000000006106851

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0201	CYL1 INJECTOR (No. 1 cylinder fuel injector circuit open)	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	• Harness or connectors (The fuel injector circuit is open.) • Fuel injector
P0202	CYL2 INJECTOR (No. 2 cylinder fuel injector circuit open)	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203	CYL3 INJECTOR (No. 3 cylinder fuel injector circuit open)	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204	CYL4 INJECTOR (No. 4 cylinder fuel injector circuit open)	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION

Ambient temperature is more than -20°C (-4°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1086, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106852

Perform the trouble diagnosis for fuel injector circuit. Refer to [EC-1193, "Diagnosis Procedure"](#).

P0217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:000000006106853

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0217	ENG OVER TEMP [Engine over temperature (Overheat)]	- Cooling fan (crankshaft driven) does not operate properly (Overheat). - Cooling fan system does not operate properly (Overheat). - Engine coolant was not added to the system using the proper filling method. - Engine coolant is not within the specified range.	- Cooling fan - Fan coupling - Radiator hose - Radiator - Radiator cap - Water pump - Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio.
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-1087, "Component Function Check"](#).

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1088, "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000006106854

1.CHECK THE COOLANT LEVEL IN THE RESERVOIR TANK AND RADIATOR

WARNING:

Never remove a radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

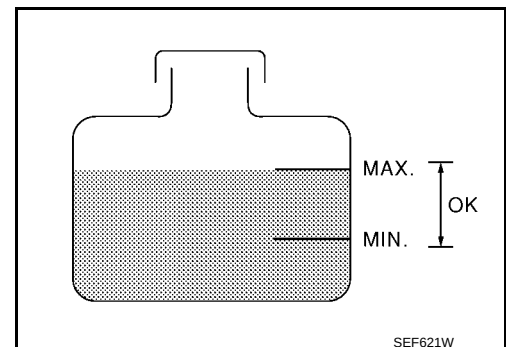
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Proceed to [EC-1088, "Diagnosis Procedure"](#).

NO >> GO TO 2.



SEF621W

P0217 ENGINE OVER TEMPERATURE

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

2. INTERVIEW TO CUSTOMER

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC-1088, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106855

1. CHECK COOLING FAN OPERATION

Start engine and check cooling fan operation.

Dose cooling fan operation normal?

- YES >> GO TO 2.
NO >> Check cooling fan and fan coupling. Refer to [CO-49, "Removal and Installation \(Crankshaft Driven Type\)"](#).

2. CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to [CO-38, "Inspection"](#).

Is leakage detected?

- YES >> GO TO 3.
NO >> GO TO 4.

3. CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to [CO-41, "Removal and Installation"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to [CO-53, "Removal and Installation"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace thermostat

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to [EC-1078, "Component Inspection \(Engine Coolant Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace engine coolant temperature sensor.

7. PERFORM OVERHEATING CAUSE ANALYSIS

Perform overheating cause analysis. Refer to [CO-35, "Troubleshooting Chart"](#).

>> INSPECTION END

P0222, P0223 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0222, P0223 APP SENSOR

DTC Logic

INFOID:000000006106856

DTC DETECTION LOGIC

NOTE:

If DTC P0220 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0222	APP SEN 2/CIRCUIT (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	- Harness or connectors (The APP sensor 2 circuit is open or shorted.) - Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223	APP SEN 2/CIRCUIT (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1089, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106857

1. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between APP sensor and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E108	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	5	E212	121	Existed

- Also check harness for short to ground and short to power.

P0222, P0223 APP SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	6	E212	120	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR

Check APP sensor. Refer to [EC-1090, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace accelerator pedal assembly. Refer to [ACC-3, "Component"](#).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006106858

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector.

(+) (V)		(-)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E212	107 (APP sensor 1 signal)	E212	108	Accelerator pedal	Fully released	0.65 - 0.87 V
					Fully depressed	More than 4.3 V
E212	120 (APP sensor 2 signal)	E212	121	Accelerator pedal	Fully released	0.28 - 0.48 V
					Fully depressed	More than 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly.

P0234 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0234 TC SYSTEM

DTC Logic

INFOID:000000006106859

DTC DETECTION LOGIC

NOTE:

- If DTC P0234 is detected with a diagnosis result of TC boost sensor, perform TC boost sensor diagnosis first.
- If DTC P0234 is detected with a diagnosis result of TC boost control actuator, perform TC boost control actuator diagnosis first.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0234	TC SYSTEM (Turbocharger overboost condition)	ECM detects TC boost pressure is excessively high.	• Turbocharger • TC boost control actuator

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to [EC-1091. "Component Function Check"](#).

NOTE:

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-1091. "Diagnosis Procedure"](#).

Component Function Check

INFOID:000000006106860

1.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. Perform "TC BOOST CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Activate the TC boost control actuator and visually check the rod movement.

Without CONSULT

Make sure that TC boost control actuator rod moves slightly when engine is started.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-1091. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106861

1.CHECK TC BOOST CONTROL ACTUATOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect TC boost control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between TC boost control actuator harness connector and ground.

+		-	Voltage
TC boost control actuator			
Connector	Terminal		
F101	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK TC BOOST CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between TC boost control actuator harness connector and IPDM E/R harness connector.

+		-		Continuity
TC boost control actuator		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F101	1	E12	4	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for TC boost control actuator power supply circuit.
 NO >> Repair or replace error-detected parts.

3. CHECK TC BOOST CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between TC boost control actuator harness connector and ground.

+		-	Continuity
TC boost control actuator			
Connector	Terminal		
F101	2	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

4. REPLACE TC BOOST CONTROL ACTUATOR

1. Replace turbocharger assembly. Refer to [EM-167, "Component"](#).
2. Perform component function check again. Refer to [EC-1091, "Component Function Check"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

P0237, P0238 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0237, P0238 TC BOOST SENSOR

DTC Logic

INFOID:000000006106862

DTC DETECTION LOGIC

NOTE:

If DTC P0237 or P0238 is display with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0237	TC BOOST SEN/CIRC (Turbocharger boost sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Turbocharger boost sensor
P0238	TC BOOST SEN/CIRC (Turbocharger boost sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1093, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106863

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
E44	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F44	1	F115	55	Existed

P0237, P0238 TC BOOST SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F44	2	F115	61	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1070, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace turbocharger boost sensor.

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000006106864

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Remove turbocharger boost sensor with its harness connected.
4. Use pump to apply pressure to sensor.

NOTE:

- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

5. Check the voltage between ECM harness connector.

ECM			Condition (pressure gauge)	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	48 (Turbocharger boost sensor signal)	55	0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approx. 2.3 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	Approx. 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor.

P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000006106865

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor	Engine speed	On board diagnosis of misfire

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0301	INJ/CIRC1 (No.1 cylinder misfire detected)	No. 1 cylinder misfires.	• Poor compression • Incorrect fuel injector connection • Fuel injector • Lack of fuel
P0302	INJ/CIRC2 (No. 2 cylinder misfire detected)	No. 2 cylinder misfires.	
P0303	INJ/CIRC3 (No. 3 cylinder misfire detected)	No. 3 cylinder misfires.	
P0304	INJ/CIRC4 (No. 4 cylinder misfire detected)	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for approximately 30 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1095, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106866

1.CHECK FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.
 - Fuel line from fuel pump to fuel rail
 - Fuel rail
 - Fuel line from fuel rail to fuel injector.

Is intake air leak detected?

- YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2.CHECK FUEL INJECTOR-I

With CONSULT

1. Remove two fuel injectors.

NOTE:

One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.

2. Swap the two fuel injectors to the other cylinder.

< DTC/CIRCUIT DIAGNOSIS >

3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform injector adjustment value registration. Refer to [EC-1040, "Description"](#).
6. Select "SELF DIAG RESULTS" mode with CONSULT.
7. Touch "ERASE".
8. Perform DTC confirmation procedure again. Refer to [EC-1095, "DTC Logic"](#).
9. Is DTC displayed for the other cylinder?

**With GST**

1. Remove two fuel injectors.

NOTE:

One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.

2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform injector adjustment value registration. Refer to [EC-1040, "Work Procedure"](#).
6. Select Service \$04 with GST.
7. Perform DTC confirmation procedure again. Refer to [EC-1095, "DTC Logic"](#).

Is DTC displayed for the other cylinder?

- YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK FUEL INJECTOR-II

Check the injector of error-detected cylinder. Refer to [EC-1193, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Replace the malfunctioning fuel injector. Refer to [EM-181, "Exploded View"](#).

4.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-232, "On-Vehicle Service"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

P0335, P0336 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0335, P0336 CRANKSHAFT POSITION SENSOR

DTC Logic

INFOID:000000006106867

DTC DETECTION LOGIC

NOTE:

If DTC P0335 and/or P0336 is displayed with DTC P0642 or P0643, first perform the trouble diagnosis for DTC P0642 or P0643. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor circuit)	Crankshaft position sensor signal is not detect by the ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor
P0336	CKP SENSOR (Crankshaft position sensor circuit range/performance)	Crankshaft position sensor signal is not in the normal pattern when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If engine could not start, keep ignition switch at START position for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1097, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106868

1. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F35	1	F115	43	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK CKP SENSOR

Check CKP sensor. Refer to [EC-1098, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

P0335, P0336 CRANKSHAFT POSITION SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace CKP sensor.

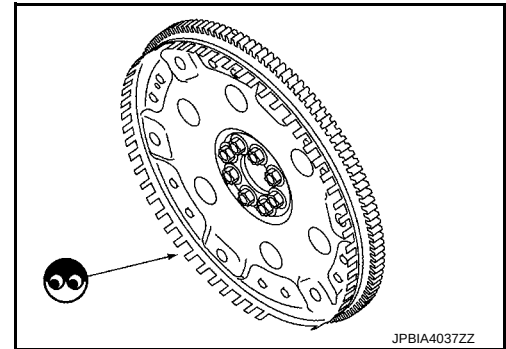
3.CHECK SIGNAL PLATE

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace the signal plate.



INFOID:000000006106869

Component Inspection (Crankshaft Position Sensor)

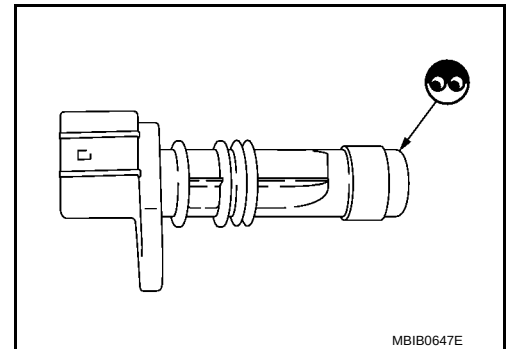
1.VISUALLY CHECK

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace crankshaft position sensor.



2.CHECK RESISTANCE

Check resistance between crankshaft position sensor terminal.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor.

P0340, P0341 CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0340, P0341 CAMSHAFT POSITION SENSOR

DTC Logic

INFOID:000000006106870

DTC DETECTION LOGIC

NOTE:

If DTC P0340 and/or P0341 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRCUIT (Camshaft position sensor circuit)	Camshaft position sensor signal is not detect by the ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor
P0341	CMP SENSOR (Camshaft position sensor circuit range/performance)	Camshaft position sensor signal is not in the normal pattern when engine is running.	• Harness connectors (The sensor circuit is opener shorted.) • Camshaft position sensor • Signal plate • Starting system circuit • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.

NOTE:

If engine could start, keep ignition switch at START position for 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1099, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106871

1.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor harness connector and ground.

CMP sensor		Ground	Voltage
Connector	Terminal		
F17	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

P0340, P0341 CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F17	2	F115	18	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and CMP sensor harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F17	3	F115	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CAMSHAFT POSITION SENSOR

Check camshaft position sensor. Refer to [EC-1100. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace camshaft position sensor.

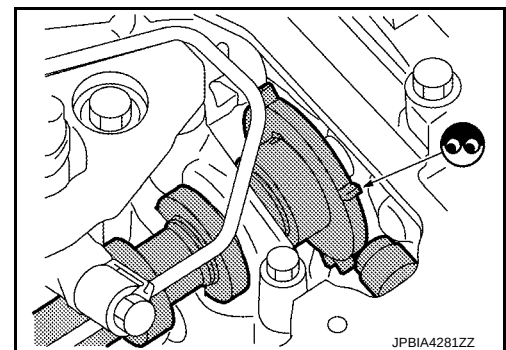
5.CHECK SIGNAL PLATE

Visually check for chipping signal plate of camshaft rear end.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038. "Description".](#)

NO >> Replace camshaft sprocket (intake).



Component Inspection (Camshaft Position Sensor)

INFOID:000000006106872

1.VISUALLY CHECK

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor harness connector.
4. Remove the sensor.

P0340, P0341 CAMSHAFT POSITION SENSOR

[YD25DDTi]

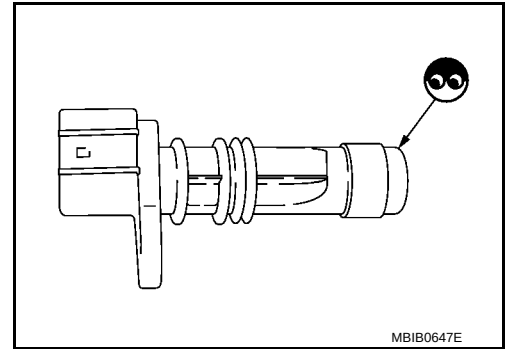
< DTC/CIRCUIT DIAGNOSIS >

5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor.



2.CHECK RESISTANCE

Check the resistance between camshaft position sensor terminal as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor.

P0380, P0670 GLOW CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0380, P0670 GLOW CONTROL UNIT

DTC Logic

INFOID:000000006106873

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0380	GLOWRELAY (Glow control unit circuit)	An improper voltage signal is sent to ECM from glow control unit	• Harness or connectors (Glow control unit input signal circuit is open or shorted.) • Glow control unit
P0670	GLOW PLUG CONT MDL (Glow control unit circuit)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1102, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106874

1.CHECK GLOW CONTROL UNIT POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect glow control unit harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow control unit harness connector and ground.

+		−	Voltage
Glow control unit			
Connector	Terminal		
E235	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK GLOW CONTROL UNIT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
Glow control unit		ECM		
Connector	Terminal	Connector	Terminal	
E235	3	E212	137	Existed
	8		131	

4. Also check harness for short to ground and to power.

P0380, P0670 GLOW CONTROL UNIT

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK GLOW PLUG CONTROL CIRCUIT

1. Remove glow plug connectors.
2. Check the continuity between ECM harness connector and glow plug terminals.

+		-		Continuity
ECM		Glow plug		
Connector	Terminal	Connector	Terminal	
E235	2	F102 (No.1)	1	Existed
	7	F103 (No.2)		
	1	F104 (No.3)		
	6	F105 (No.4)		

3. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK GLOW PLUG

Check glow plug. Refer to [EC-1103, "Component Inspection \(Glow Plug\)"](#).

Is inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunction glow plug.

5.CHECK INTERMITTENT INCIDENT

Perform [EC-1038, "Description"](#).

Is inspection result normal?

YES >> Replace glow control unit.

NO >> Repair or replace error-detected parts.

Component Inspection (Glow Plug)

INFOID:000000006106875

CAUTION:

- Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.
- If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.
- If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.
- Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.

1.CHECK GLOW PLUG

1. Disconnect glow plug connectors.
2. Check resistance glow plug terminal and glow plug stem.

Terminals	Resistance
1 and glow plug stem	Approx. 0.2 – 0.5 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning glow plug. Refer to [EM-178, "Component"](#).

P0403 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0403 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:000000006106876

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0403	EGR SYSTEM (EGR volume control valve stuck)	Excessively high duty voltage signal is sent to the valve for the specified time.	• Harness and connector (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve stuck closed • EGR passage clogged • EGR volume control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to normal operating temperature.
2. Stop the engine and wait at least 10 seconds.
3. Restart the engine and let it idle for 5 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1104, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106877

1.INSPECTION START

Will CONSULT be used?

- YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK EGR VOLUME CONTROL VALVE FUNCTION

 **With CONSULT**

1. Turn ignition switch OFF.
2. Select "TRG EGR/V ANGLE" in "ACTIVE TEST" mode with CONSULT.

NOTE:

Select "EGR V/POS SEN" of data monitor item.

3. Activate the EGR volume control valve and check "EGR V/POS SEN" indication value is changed.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

P0403 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

+				Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F107	4	E212	141	Existed
	5		154	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the malfunctioning part.

4.CHECK DC MOTOR

Refer to [EC-1105, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace EGR volume control valve. Refer to [EM-159, "Exploded View"](#).

5.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR

Refer to [EC-1106, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace the malfunctioning part.

6.CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace the malfunctioning part.

Component Inspection

INFOID:000000006487210

1.CHECK EGR VOLUME CONTROL VALVE (DC MOTOR)

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check the resistance between EGR volume control valve terminals.

+	–	Resistance
EGR volume control valve		
Terminal		
4	5	0.3 – 100 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR volume control valve. Refer to [EM-159, "Exploded View"](#).

P0405, P0406 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0405, P0406 EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:000000006106878

DTC DETECTION LOGIC

NOTE:

If DTC P0405, P0406 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0405	EGR SENSOR (EGR volume control valve position sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • EGR volume control valve control position sensor
P0406	EGR SENSOR (EGR volume control valve position sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to normal operating temperature.
2. Stop the engine and wait at least 10 seconds.
3. Restart the engine and let it idle for 5 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1106, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106879

1. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between EGR volume control valve harness connector and ground.

EGR volume control valve		Ground	Voltage
Connector	Terminal		
F107	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

P0405, P0406 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	3	F115	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	2	F115	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace the EGR volume control valve. Refer to [EM-159, "Exploded View"](#).

NO >> Repair or replace malfunctioning part.

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:000000006106880

DTC DETECTION LOGIC

NOTE:

If DTC P0409 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0409	EGR SYSTEM (EGR volume control valve does not operate properly.)	The characteristic of EGR volume control valve is not in the specified range.	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to normal operating temperature.

NOTE:

Engine coolant temperature is more than 81°C (178°F)

2. Stop the engine and wait at least 10 seconds.
3. Restart the engine and let it idle for 5 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1108, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106881

1. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between EGR volume control valve harness connector and ground.

EGR volume control valve		Ground	Voltage
Connector	Terminal		
F107	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	3	F115	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	2	F115	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace the EGR volume control valve. Refer to [EM-159, "Exploded View"](#).

NO >> Repair or replace malfunctioning part.

P0473 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0473 EXHAUST GAS PRESSURE SENSOR 1

DTC Logic

INFOID:000000006106882

NOTE:

If DTC P0473 is displayed with DTC P0642 or P0643, perform the trouble diagnosis for DTC P0642 or P0643.

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0473	EXH PRESSURE SEN A (Exhaust gas pressure sensor 1 circuit high input)	Signal voltage from exhaust pressure sensor 1 remains 4.9 V or more for 2 seconds or more	• Harness or connectors (Exhaust gas pressure sensor 1 cir- cuit is open or shorted.) • Exhaust gas pressure sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1110. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106883

1.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect exhaust gas pressure sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas pressure sensor 1 harness connector terminals.

Exhaust gas pressure sensor 1			Voltage (Approx.)
Connector	+	–	
	terminal		
F113	3	1	5 V

Inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY-II

Check the voltage between exhaust gas pressure sensor 1 harness connector and ground.

+		−	Voltage (Approx.)
Exhaust gas pressure sensor 1			
Connector	Terminal		
F113	3	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

P0473 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

NO >> GO TO 3.

3.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F113	3	F115	21	Existed

4. Also check harness for short to ground.

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS PRESSURE SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F113	1	F115	54	Existed

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).

NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST GAS PRESSURE SENSOR 1 SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

P0473 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F113	2	F115	60	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK EXHAUST GAS PRESSURE SENSOR 1

Refer to [EC-1067, "Component Inspection \(IAT sensor 2\)"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace exhaust gas pressure sensor 1.

Component Inspection (Exhaust Gas Pressure Sensor 1)

INFOID:000000006106884

1. CHECK EXHAUST GAS PRESSURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect exhaust gas pressure sensor 1 harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 connector terminals.

Exhaust gas pressure sensor 1		Continuity
+	—	
Terminal		
1	2	Except 0 or $\infty \Omega$
1	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas pressure sensor 1.

P0488 EGR SYSTEM

DTC Logic

INFOID:000000006106885

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0488	EGR SYSTEM (EGR driving circuit does not function properly.)	ECM internal circuit for driving the EGR volume control valve does not function properly due to high temperature or excessive current.	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to normal operating temperature.
2. Stop the engine and wait at least 10 seconds.
3. Restart the engine and let it idle for 5 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1113, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106886

1. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect EGR volume control valve harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	2	F115	33	Existed

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

- YES >> Replace EGR volume control valve. Refer to [EM-159, "Exploded View"](#).
 NO >> Repair or replace malfunctioning part.

P0501, P0502, P0503 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0501, P0502, P0503 VEHICLE SPEED SIGNAL

Description

INFOID:000000006106887

ECM receives vehicle speed signal from combination meter via CAN communication line.
ECM uses the signal for ASCD control.

DTC Logic

INFOID:000000006106888

DTC DETECTION LOGIC

The MIL will not light up for this self-diagnosis.

NOTE:

- If DTC P0501, P0502, P0503 is displayed with DTC U1000 perform the trouble diagnosis for DTC U1000. Refer to [EC-1048, "DTC Logic"](#).
- If DTC P0501, P0502, P0503 is displayed with DTC P0606, perform the trouble diagnosis for DTC P0606. Refer to [EC-1130, "DTC Logic"](#).

DTC No.	Trouble Diagnosis Name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0501	VEHICLE SPEED (Vehicle speed sensor range/performance)	A change of vehicle speed signal is excessively large during specified time.	• Harness or connectors (The CAN communication line is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • ECM
P0502	VEHICLE SPEED (Vehicle speed sensor circuit low input)	Vehicle speed signal is excessively low compared with the driving condition.	
P0503	VEHICLE SPEED (Vehicle speed sensor circuit high input)	Vehicle speed signal is excessively high compared with the driving condition.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ESP switch OFF.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

1. Start the engine.
2. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1114, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106889

1. CHECK SPEEDOMETER OPERATION

1. Drive the vehicle.
2. Check speedometer meter operation.

Does speedometer meter operate normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for speedometer.

2. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-19, "CONSULT Functions"](#).

Is the inspection result normal?

YES >> INSPECTION END

P0501, P0502, P0503 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

NO >> Repair or replace malfunctioning part.

A

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P0504 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0504 ASCD BRAKE SWITCH

DTC Logic

INFOID:000000006106890

DTC DETECTION LOGIC

The MIL will not light up for this diagnosis.

DTC No.	Trouble Diagnosis Name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0504	BRAKE SW/CIRCUIT (ASCD brake switch)	When the vehicle speed is above 5 km/h (3 MPH), ON signal from the stop lamp switch and OFF signal from the ASCD brake switch are sent to the ECM at the same time.	- Harness or connectors (The stop lamp switch circuit is open or shorted.) - Harness or connectors (The ASCD brake switch circuit is open or shorted.) - Harness or connectors (The ASCD clutch switch circuit is open or shorted.) (M/T) - Stop lamp switch - ASCD brake switch - ASCD clutch switch (M/T) - Incorrect stop lamp switch installation - Incorrect ASCD brake switch installation - Incorrect ASCD clutch switch installation (M/T) - ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ESP switch OFF.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

- Start the engine.
- Drive the vehicle at more than 5 km/h (3 MPH) for at least 5 seconds.
- Depress the brake pedal and keep vehicle speed more than 5 km/h (3 MPH) for at least 5 seconds.

NOTE:

For M/T models: Clutch pedal is released.

- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> • A/T models: Refer to [EC-1116, "A/T : Diagnosis Procedure"](#).
• M/T models: Refer to [EC-1118, "M/T : Diagnosis Procedure"](#).

- NO >> INSPECTION END

A/T

A/T : Diagnosis Procedure

INFOID:000000006106891

1. CHECK STOP LAMP SWITCH SIGNAL

With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW" in "DATA MONITOR" mode with CONSULT.
- With operating the brake pedal, check the monitor status.

P0504 ASCD BRAKE SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Monitor Item	Condition		Indication
BRAKE SW	Brake pedal	Fully released	OFF
		Slightly depressed	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E212	136	Ground	Fully released	Approx. 0 V
			Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK BRAKE PEDAL POSITION SWITCH SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW2" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

Monitor Item	Condition		Indication
BRAKE SW2	Brake pedal	Fully released	OFF
		Slightly depressed	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F115	80	Ground	Fully released	Battery voltage
			Slightly depressed	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E109	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch harness connector and ECM harness connector.

P0504 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F109	2	E212	136	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to [EC-1121, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace stop lamp switch.

6.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F110	2	E115	80	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK ASCD BRAKE SWITCH

Check ASCD clutch switch. Refer to [EC-1121, "Component Inspection \(ASCD Brake Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace ASCD brake switch.

M/T

M/T : Diagnosis Procedure

INFOID:000000006106892

1.CHECK STOP LAMP SWITCH SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

P0504 ASCD BRAKE SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Monitor Item	Condition		Indication
BRAKE SW	Brake pedal	Fully released	OFF
		Slightly depressed	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E212	136	Ground	Fully released	Approx. 0 V
			Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK BRAKE PEDAL POSITION SWITCH SIGNAL AND CLUTCH POSITION SWITCH SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW2" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

Monitor Item	Condition		Indication
BRAKE SW2	Brake pedal (Clutch is released.)	Fully released	OFF
		Slightly depressed	ON
	Clutch pedal (Brake pedal is released.)	Fully released	OFF
		Slightly depressed	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F115	80	Ground	Brake pedal (Clutch is released.)	Fully released	Battery voltage
				Slightly depressed	Approx. 0 V
			Clutch pedal (Brake pedal is re- leased.)	Fully released	Battery voltage
				Slightly depressed	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E116	1	Ground	Battery voltage

P0504 ASCD BRAKE SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F116	2	E212	136	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to [EC-1121, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace stop lamp switch.

6. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ASCD clutch switch harness connector.
2. Check harness continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	F111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ASCD clutch switch harness connector and ECM harness connector.

P0504 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ACSD clutch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F111	2	E115	80	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD BRAKE SWITCH

Check ASCD brake switch. Refer to [EC-1121, "Component Inspection \(ASCD Brake Switch\)"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace ASCD brake switch.

10.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to [EC-1122, "Component Inspection \(ASCD Clutch Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace ASCD clutch switch.

Component Inspection (ASCD Brake Switch)

INFOID:000000006106893

1.CHECK ASCD BRAKE SWITCH

1. Adjust ASCD brake switch installation. Refer to [BR-5, "Inspection and Adjustment"](#).
2. Turn ignition switch OFF.
3. Disconnect ASCD brake switch harness connector.
4. Check the continuity between ASCD brake switch terminals.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch.

Component Inspection (Stop Lamp Switch)

INFOID:000000006106894

1.CHECK STOP LAMP SWITCH

1. Adjust stop lamp switch installation. Refer to [BR-5, "Inspection and Adjustment"](#).
2. Turn ignition switch OFF.
3. Disconnect stop lamp switch harness connector.
4. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P0504 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (ASCD Clutch Switch)

INFOID:000000006106895

1.CHECK ASCD CLUTCH SWITCH

1. Check clutch pedal height and ASCD clutch switch installation. Refer to [CL-6, "On Board Inspection"](#).
2. Turn ignition switch OFF.
3. Disconnect ASCD clutch switch harness connector.
4. Check the continuity between ASCD clutch switch terminals.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD Clutch switch.

P0545, P0546 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0545, P0546 EGT SENSOR 1

DTC Logic

INFOID:000000006106896

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0545	EGT SENSOR 1 B1 (EGT sensor 1 circuit low input)	Signal voltage from EGT sensor 1 remains 0.1V or less for 5 seconds or more	• Harness or connectors (EGT sensor 1 circuit is open or shorted.) • EGT sensor 1
P0546	EGT SENSOR 1 B1 (EGT sensor 1 circuit high input)	Signal voltage from EGT sensor 1 remains 4.95V or more for 5 seconds or more	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1123, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to the normal operating temperature.
2. Drive according the following directions for 6 seconds or more.

Condition	
Engine speed:	3,000 rpm or less
Vehicle speed:	30 km/h (19MPH) or more
Accelerator pedal:	Depress 3/8 or more

CAUTION:

Always drive safely.

3. Stop the vehicle.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1123, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106897

1. CHECK EGT SENSOR 1 POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect EGT sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGT sensor 1 harness connector terminals.

P0545, P0546 EGT SENSOR 1

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

EGT sensor 1			Voltage (Approx.)
Connector	+	−	
	terminal		
F110	1	2	5 V

Inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK EGT SENSOR 1 POWER SUPPLY-II

Check the voltage between EGT sensor 1 harness connector and ground.

+		-	Voltage (Approx.)
EGT sensor 1			
Connector	Terminal		
F110	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EGT SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGT sensor 1 harness connector and ECM harness connector.

+		-		Continuity
EGT sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F110	1	F115	5	Existed

4. Also check harness for short to ground.

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK EGT SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGT sensor 1 harness connector and ECM harness connector.

+		-		Continuity
EGT sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F110	2	F115	6	Existed

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EGT ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0545, P0546 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

+		-	Continuity
ECM			
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Repair or replace error-detected parts.

6.CHECK EGT SENSOR 1

Check EGT sensor 1. Refer to [EC-1125, "Component Inspection \(EGT Sensor 1\)"](#).

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Replace EGT sensor 1.

Component Inspection (EGT Sensor 1)

INFOID:0000000006106898

1.CHECK EGT SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect EGT sensor 1 harness connector.
3. Check the resistance between EGT sensor 1 harness connector terminals.

+	−	Condition	Resistance (kΩ) (Approx.)
EGT sensor 1			
Terminal			
1	2	Temperature: 20°C (68°F)	118
		Temperature: 80°C (176°F)	27

Is the inspection result normal?

- YES >> INSPECTION END.
NO >> Replace EGT sensor 1.

P0563 BATTERY VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0563 BATTERY VOLTAGE

DTC Logic

INFOID:000000006106899

DTC DETECTION LOGIC

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0563	BATTERY VOLTAGE (Battery voltage high)	An excessively high voltage from the battery is sent to ECM.	• Battery • Battery terminal • Alternator • Incorrect jump starting

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 35 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1126, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106900

1. CHECK BATTERY CABLE INSTALLATION

Check battery cable installation.

Is battery cable installed properly?

YES >> GO TO 2.
NO >> Install properly.

2. CHECK TYPE OF BATTERY AND ALTERNATOR

Check that the proper type of battery type of alternator are installed.

Refer to [SC-53, "Battery"](#) and [SC-53, "Alternator"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for alternator. Refer to [SC-18, "Trouble Diagnosis"](#).
NO >> Replace with the proper one.

P0580, P0581 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0580, P0581 ASCD STEERING SWITCH

DTC Logic

INFOID:000000006106901

DTC DETECTION LOGIC

The MIL will not light up for these diagnoses.

NOTE:

If DTC P0580 or P0581 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to [EC-1130, "DTC Logic"](#).

DTC No.	Trouble Diagnosis Name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0580	STRG SW/CIRC (ASCD steering switch circuit low)	ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM
P0581	STRG SW/CIRC (ASCD steering switch circuit high)	An excessively high voltage signal from the ASCD steering switch is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1127, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106902

1. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select "MAIN SW", "RESUME/ACC SW", "SET SW" and "CANCEL SW" in "DATA MONITOR" mode with CONSULT.
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
ASCD MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

P0580, P0581 ASCD STEERING SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

(+) Connector		(-) Connector		Condition	Voltage
Terminal	Terminal	Terminal	Terminal		
F115	34	F115	10	ASCD MAIN switch: Pressed	Approx. 0V
				CANCEL switch: Pressed	Approx. 1V
				SET/COAST switch: Pressed	Approx. 2V
				RESUME/ACCELERATE switch: Pressed	Approx. 3V
				ALL ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M32	31	F115	10	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M32	32	F115	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Harness for open and short between ECM and combination switch

4.CHECK ASCD STEERING SWITCH

Check ASCD steering switch. Refer to [EC-1129, "Component Inspection \(ASCD Steering Switch\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Replace ASCD steering switch.

P0580, P0581 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (ASCD Steering Switch)

INFOID:000000006106903

1. CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M302	16 and 17	ASCD MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [PS-10, "Removal and Installation"](#).

< DTC/CIRCUIT DIAGNOSIS >

P0605, P0606 ECM

DTC Logic

INFOID:000000006106904

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0605	ECM [Engine control module (ROM)]	ECM ROM is malfunctioning.	ECM
P0606	ECM [Engine control module (Processor)]	ECM calculation function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1130, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106905

1. DTC CONFIRMATION

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-1186, "DTC Logic"](#).
4. Check the DTC.

Is the DTC displayed again?

YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> INSPECTION END

P0607 ECM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0607 ECM

Description

INFOID:0000000006106906

This is detected when a CAN communication error occurs in ECM.

DTC Logic

INFOID:0000000006106907

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0607	ECM (CAN communication bus)	Detecting error during the initial diagnosis of CAN controller of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1131, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006106908

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-1131, "DTC Logic"](#).
4. Check DTC.

Is the DTC P0607 displayed again?

YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> INSPECTION END

P0628, P0629 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0628, P0629 FUEL PUMP

DTC Logic

INFOID:000000006106909

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0628	FUEL PUMP/CIRC (Fuel pump control circuit low input)	ECM detects a control circuit for the fuel pump is open or short to ground.	• Harness or connectors (The fuel pump circuit is open or shorted.) • Fuel pump • Fuel pump suction control valve
P0629	FUEL PUMP/CIRC (Fuel pump control circuit high input)	ECM detects a control circuit for the fuel pump is short to power.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1132, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106910

1.CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connector.
3. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	116	F100	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	103	F100	1	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

P0628, P0629 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

3.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1133, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)

NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084976

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

DTC Logic

INFOID:000000006106911

DTC DETECTION LOGIC

**This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0638	ETC ACTR (Electric throttle control actuator range/performance)	There is a gap between angle of target and phase-control angle.	Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1134, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106912

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check that a foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace the electric throttle control actuator. Refer to [EM-164, "Removal and Installation"](#).

>> GO TO 3.

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR OPERATION

With CONSULT

1. Turn ignition switch ON and OFF.
2. Turn ignition switch ON and select "TARGET ETC ANGLE" in "ACTIVE TEST" mode.
3. Make sure that throttle valve operates correctly.

Without CONSULT

1. Turn ignition switch ON and OFF.
2. With turn ignition switch ON and OFF, make sure that throttle valve operates correctly.

>> INSPECTION END

P0642, P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0642, P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006106913

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0642	SENSOR PWR/CIRC1 (Sensor power supply circuit 1 low)	ECM detects a voltage of power source for sensor is excessively low.	• Harness or connectors for following circuit is shorted. - Accelerator pedal position sensor 2 - Throttle position sensor - Camshaft position sensor - Fuel rail pressure sensor - Turbocharger boost sensor - Refrigerant pressure sensor - Exhaust gas pressure sensor 1 • Accelerator pedal position sensor (Accelerator pedal position sensor 2) • Throttle position sensor • Camshaft position sensor • Fuel rail pressure sensor • Turbocharger boost sensor • Refrigerant pressure sensor • Exhaust gas pressure sensor 1
P0643	SENSOR PWR/CIRC1 (Sensor power supply circuit 1 high)	ECM detects a voltage of power source for sensor is excessively high.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1135, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106914

1.CHECK SENSOR POWER SUPPLY OUTPUT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E212	119	Ground	Approx. 5 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

P0642, P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E212	119	Accelerator pedal position sensor 2	E108	1
F115	44	Throttle position sensor	F106	2
F115	45	Camshaft position sensor	F17	1
F115	46	Fuel rail pressure sensor	F11	1
F115	48	Turbocharger boost sensor	E44	3
F115	20	Refrigerant pressure sensor	E43	3
F115	21	Exhaust gas pressure sensor 1	F113	3

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor 2 (Refer to [EC-1079, "Diagnosis Procedure"](#).)
- Throttle position sensor (Refer to [EC-1191, "Diagnosis Procedure"](#).)
- Camshaft position sensor (Refer to [EC-1099, "Diagnosis Procedure"](#).)
- Turbocharger boost sensor (Refer to [EC-1093, "Diagnosis Procedure"](#).)
- Refrigerant pressure sensor (Refer to [EC-1203, "Diagnosis Procedure"](#).)
- Exhaust gas pressure sensor 1 (Refer to [EC-1110, "Diagnosis Procedure"](#).)
- Fuel rail pressure sensor (Refer to [EC-1083, "Diagnosis Procedure"](#).)

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace malfunctioning component.

P0652, P0653 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0652, P0653 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006106915

DTC DETECTION LOGIC

MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0652	SENSOR PWR/CIRC2 (Sensor power supply circuit 2 low)	ECM detects a voltage of power source for sensor is excessively low.	• Harness or connectors for following circuit is shorted. - Accelerator pedal position sensor 1 - Crankshaft position sensor - EGR volume control valve position sensor - Battery current sensor • Accelerator pedal position sensor (Accelerator pedal position sensor 1) • Crankshaft position sensor • EGR volume control valve position sensor • Battery current sensor
P0653	SENSOR PWR/CIRC2 (Sensor power supply circuit 2 high)	ECM detects a voltage of power source for sensor is excessively high.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1137, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106916

1.CHECK SENSOR POWER SUPPLY OUTPUT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E212	106	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

P0652, P0653 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E212	106	Accelerator pedal position sensor 1	E108	2
F115	22	Crankshaft position sensor	F35	3
F115	23	EGR volume control valve position sensor	F107	1
E212	105	Battery current sensor	E210	1

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor 1 (Refer to [EC-1089, "Diagnosis Procedure"](#).)
- Crankshaft position sensor (Refer to [EC-1097, "Diagnosis Procedure"](#).)
- EGR volume control valve position sensor (Refer to [EC-1106, "Diagnosis Procedure"](#).)
- Battery current sensor (Refer to [EC-1166, "Diagnosis Procedure"](#).)

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace malfunctioning component.

P0668, P0669 BAROMETRIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0668, P0669 BAROMETRIC PRESSURE SENSOR

DTC Logic

INFOID:000000006106917

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0668	ECM (ECM internal temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	ECM
P0669	ECM (ECM internal temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1139, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106918

1. DTC CONFIRMATION

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-1186, "DTC Logic"](#).
4. Check the DTC.

Is the DTC displayed again?

- YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> INSPECTION END

P0686 ECM RELAY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P0686 ECM RELAY

DTC Logic

INFOID:000000006106919

DTC DETECTION LOGIC

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0686	ECM RELAY (ECM relay circuit)	ECM detects ECM relay is stuck closed even if ignition switch OFF.	• Harness or connectors (The ECM relay circuit is shorted.) • ECM relay

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON and wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1140, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106920

1. CHECK ECM RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM harness connector terminals as follows.

+		-		Voltage
Connector	Terminal	Connector	Terminal	
E212	101	E212	97	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.
			98	
			99	
			100	
			114	
	102		97	
			98	
			99	
			100	
			114	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> GO TO 2.

2. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF, and wait at least 10 seconds.
2. Check voltage between ECM harness connector terminals as follows.

P0686 ECM RELAY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

+		−		Voltage
Connector	Terminal	Connector	Terminal	
E212	129	E212	97	Battery voltage
			98	
			99	
			100	
			114	
	130		97	
			98	
			99	
			100	
			114	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and IPDM E/R harness connector.
3. Check harness continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E212	129	F12	7	Existed
	130			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ECM RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and IPDM E/R harness connector.
3. Check harness continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E212	101	F12	3	Existed
	102		4	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

P1020, P1021, P1022, P1023, P1024, P1025, P1026 TC BOOST CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1020, P1021, P1022, P1023, P1024, P1025, P1026 TC BOOST CONTROL ACTUATOR

DTC Logic

INFOID:000000006106921

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1020	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal motor locking signal from the TC boost control actuator to ECM.	• Turbocharger • TC boost control actuator
P1021	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal operating signal from the TC boost control actuator to ECM.	
P1022	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal position sensor signal from the TC boost control actuator to ECM.	
P1023	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal current signal from the TC boost control actuator to ECM.	
P1024	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal EEPROM signal from the TC boost control actuator to ECM.	
P1025	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal ROM signal from the TC boost control actuator to ECM.	
P1026	TC BOOST CONT ACT (TC boost control actuator error)	An abnormal RAM signal from the TC boost control actuator to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1142. "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106922

1. REPLACE TURBOCHARGER ASSEMBLY

NOTE:

Replace turbocharger assembly when this DTC is detected.

>> Replace turbocharger assembly. Refer to [EM-167. "Component"](#).

P1028 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1028 EXHAUST GAS PRESSURE SENSOR 1

Description

INFOID:000000006106923

The mutual diagnoses performed by comparing signals from exhaust gas pressure sensor 1, turbocharger boost sensor, and BARO sensor enables the detection of malfunctioning sensors.

DTC Logic

INFOID:000000006106924

DTC DETECTION LOGIC

NOTE:

If DTC P1028 is displayed with DTC P0472 or P0473, perform the Trouble diagnosis for DTC P0472, P0473. Refer to [EC-1110, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1028	EXH PRESSURE SEN A (Exhaust gas pressure sensor 1 function)	The output voltage of the exhaust gas pressure sensor 1 is out of specified range.	• Harness or connectors (Exhaust gas pressure sensor 1 circuit.) • Exhaust gas pressure sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1143, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106925

Check exhaust gas pressure sensor circuit 1. Refer to [EC-1110, "Diagnosis Procedure"](#).

P1029 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1029 TC BOOST SENSOR

Description

INFOID:000000006106926

The mutual diagnoses performed by comparing signals from exhaust gas pressure sensor 1, turbocharger boost sensor, and BARO sensor enables the detection of malfunctioning sensors.

DTC Logic

INFOID:000000006106927

DTC DETECTION LOGIC

NOTE:

If DTC P1029 is displayed with DTC P0237 or P0238, perform the Trouble diagnosis for DTC P0237, P0238. Refer to [EC-1110, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1029	EXH PRESSURE SEN A (TC boost sensor function)	The output voltage of the TC boost sensor is out of specified range.	• Harness or connectors (TC boost sensor circuit.) • TC boost sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1143, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106928

Check TC boost sensor circuit. Refer to [EC-1093, "Diagnosis Procedure"](#).

P102A BARO SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P102A BARO SENSOR

Description

INFOID:000000006106929

The mutual diagnoses performed by comparing signals from exhaust gas pressure sensor 1, turbocharger boost sensor, and BARO sensor enables the detection of malfunctioning sensors.

DTC Logic

INFOID:000000006106930

DTC DETECTION LOGIC

NOTE:

If DTC P102A is displayed with DTC P2228 or P2229, perform the Trouble diagnosis for DTC P2228, P2229. Refer to [EC-1110, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P102A	BARO SENSOR A (BARO sensor function)	The output voltage of the BARO sensor is out of specified range.	• Harness or connectors (BARO sensor circuit.) • BARO sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1143, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106931

1. CHECK EXHAUST GAS PRESSURE SENSOR 1 CIRCUIT

Check exhaust gas pressure sensor circuit 1. Refer to [EC-1110, "Diagnosis Procedure"](#).

Is inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2. CHECK TC BOOST SENSOR CIRCUIT

Check TC boost sensor circuit. Refer to [EC-1093, "Diagnosis Procedure"](#).

Is inspection result normal?

- YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

P102B EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P102B EXHAUST GAS PRESSURE SENSOR 1

DTC Logic

INFOID:000000006106932

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P102B	EXHAUST GAS SYSTEM (Exhaust gas pressure sensor air leak)	A signal of Exhaust gas pressure sensor 1 reaches the same value as atmospheric pressure.	Poor installation of exhaust

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up to the normal operating temperature.
2. Drive the vehicle for ten seconds or more with vehicle speeds 60km/h (38 MPH) or more and engine speed 2,400 rpm.

CAUTION:

Always drive safely.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1146. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106933

1. CHECK THE INSTALLATION CONDITION OF COMPONENT PART

Check the installation condition of the exhaust system-related parts. Refer to [EX-3. "Checking Exhaust System"](#)

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).
NO >> Repair or replace error-detected parts.

P1211 TCS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1211 TCS CONTROL UNIT

Description

INFOID:000000006106934

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.

Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:000000006106935

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.
- The MIL will not light up for this self-diagnosis.
- This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1211	TCS C/U FUNCTN (TCS control unit)	ECM receives malfunction information from “ABS actuator and electric unit (control unit)”.	• ABS actuator and electric unit (control unit) • TCS related parts

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1147, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106936

Perform the trouble diagnosis for EPS/TCS/ABS. Refer to [BRC-10, "How to Perform Trouble Diagnosis for Quick and Accurate Repair"](#).

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1212 TCS COMMUNICATION LINE

Description

INFOID:000000006106937

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.

Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:000000006106938

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX.
- The MIL will not light up for this self-diagnosis.
- This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1212	TCS/CIRC (TCS communication line)	ECM cannot receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1148, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106939

Perform the trouble diagnosis for EPS/TCS/ABS. Refer to [BRC-10, "How to Perform Trouble Diagnosis for Quick and Accurate Repair"](#).

NOTE:

If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.

- Trouble diagnosis for DTC UXXXX Refer to [EC-1048, "DTC Logic"](#).
- Trouble diagnosis for DTC P0607 Refer to [EC-1131, "DTC Logic"](#).

P1268 P1269, P1270, P1271 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1268 P1269, P1270, P1271 FUEL INJECTOR

DTC Logic

INFOID:000000006106940

DTC DETECTION LOGIC

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1268	INJECTOR 1 (No. 1 cylinder fuel injector)	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	• Harness or connectors (The fuel injector circuit is open or shorted.) • Injector adjustment value • Fuel injector
P1269	INJECTOR 2 (No. 2 cylinder fuel injector)	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270	INJECTOR 3 (No. 3 cylinder fuel injector)	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271	INJECTOR 4 (No. 4 cylinder fuel injector)	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE-I

1. Start the engine and let it idle for about 15 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1150, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. DTC CONFIRMATION PROCEDURE-II

WITH CONSULT

1. Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT.
2. Drive vehicle and maintain the following conditions for at least 60 seconds.

CKPS-RPM	700 - 2,000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

3. Check DTC.

WITHOUT CONSULT

1. Set voltmeter probes between ECM terminal 15 (engine coolant temperature sensor signal) and ground.
2. Restart engine and drive vehicle and maintain the following conditions for at least 60 seconds.

Engine speed	700 - 2,000 rpm (A constant rotation is maintained)
Engine coolant temperature sensor signal voltage	More than 0.6V

P1268 P1269, P1270, P1271 FUEL INJECTOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC-1150. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106941

NOTE:

This diagnosis procedure must be used with CONSULT.

1.CHECK INJECTOR ADJUSTMENT VALUE

- Turn ignition switch ON.
- Select "ENTER INJECTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT.
- Check injector adjustment values displayed on CONSULT screen.

The value displayed on CONSULT screen should be same as injector adjustment value printed on each injector.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform Injector Adjustment Value Registration. Refer to [EC-1040. "Work Procedure"](#).

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect fuel injector harness connector.
- Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.

DTC	ECM		Fuel injector		Continuity
	Connector	Terminal	Connector	Terminal	
P1268	F115	73	F13 (Cylinder No.1)	1	Existed
P1269		1	F16 (Cylinder No.2)	1	
P1270		25	F14 (Cylinder No.3)	1	
P1271		49	F15 (Cylinder No.4)	1	

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair open circuit in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN

Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.

P1268 P1269, P1270, P1271 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

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DTC	ECM		Fuel injector		Continuity
	Connector	Terminal	Connector	Terminal	
P1268	F115	74	F13 (Cylinder No.1)	2	Existed
P1269		3	F16 (Cylinder No.2)	2	
P1270		26	F14 (Cylinder No.3)	2	
P1271		51	F15 (Cylinder No.4)	2	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit in harness or connectors.

4.CHECK FUEL INJECTOR-I

Check fuel injector. Refer to [EC-1151, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel injector.

5.CHECK FUEL INJECTOR-II

1. Remove two fuel injectors.

NOTE:

One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.

2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to [EC-1040, "Work Procedure"](#).
6. Erase DTC of ECM.
7. Perform DTC Confirmation Procedure. Refer to [EC-1149, "DTC Logic"](#).

Is DTC displayed for the other cylinder?

YES >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-181, "Exploded View"](#).

NO >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

Component Inspection (Fuel Injector)

INFOID:000000006106942

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminal	Resistance
1 and 2	0.2 - 0.8 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-181, "Exploded View"](#).

P1272 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1272 FUEL PUMP

DTC Logic

INFOID:000000006106943

DTC DETECTION LOGIC

NOTE:

If DTC P1272 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1272	FRP RELIEF VALVE (Fuel rail pressure relief valve open)	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	• Harness or connectors (Fuel pump circuit is open or shorted.) • Fuel pump • Fuel pump suction control valve • Fuel rail pressure sensor • Fuel rail pressure relief valve • Air mixed with fuel • Lack of fuel

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1152, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007085188

1. CHECK AIR MIXED WITH FUEL

Check the fuel filter condition. Refer to [MA-7, "YD25DDTi : Periodic Maintenance"](#).

Is fuel filter maintenance according to the manual?

YES >> Perform air-bleeding from fuel line. Refer to [FL-17, "Air Bleeding"](#). And then, GO TO 2.

NO >> Maintenance fuel filter.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT

1. Turn ignition switch ON.
2. Perform "Fuel Pump Learning Value Clearing". Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.
4. Select "SELF-DIAG RESULT" mode with CONSULT.
5. Touch "ERASE".
6. Perform DTC confirmation procedure, again. Refer to [EC-1152, "DTC Logic"](#).
7. Check DTC.

Without CONSULT

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Start engine and let it idle for at least 60 seconds.

P1272 FUEL PUMP

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< DTC/CIRCUIT DIAGNOSIS >

4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
5. Perform DTC confirmation procedure, again. Refer to [EC-1152, "DTC Logic"](#).
6. Check DTC.

Is 1st trip DTC displayed again?

YES >> GO TO 3.

NO >> **INSPECTION END**

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM harness connector and fuel pump suction control valve harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	116	F100	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PUMP SUCTION CONTROL VALVE GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	103	F100	1	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1154, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel pump suction control valve. Refer to [EM-186, "Component"](#).

6.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1154, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

7.CHECK FUEL RAIL PRESSURE RELIEF VALVE

Check fuel rail pressure relief valve. Refer to [EC-1154, "Component Inspection \(Fuel Rail Pressure Relief Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

8.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

P1272 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 9.
NO >> Repair or replace malfunctioning parts.

9.REPLACE SUCTION CONTROL VALVE OF FUEL PUMP

1. Replace suction control valve of fuel pump. Refer to [EM-193, "Component"](#).
2. Perform fuel pump learning value clearing. Refer to [EC-1043, "Work Procedure"](#).
3. Perform DTC confirmation procedure. Refer to [EC-1152, "DTC Logic"](#).

Is 1st DTC detected?

- YES >> Replace fuel pump. Refer to [EM-186, "Component"](#).
NO >> INSPECTION END

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084977

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106946

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	40 (Fuel rail pressure sensor signal)	16	Idle	1.4 – 1.7 V
			2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

Component Inspection (Fuel Rail Pressure Relief Valve)

INFOID:000000006106947

WARNING:

- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.

1.CHECK FUEL RAIL PRESSURE RELIEF VALVE

 With CONSULT

1. Turn ignition switch OFF.

P1272 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.
5. Select "PRES REGULATOR" in "ACTIVE TEST MODE" with CONSULT.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching "UP" or "Qu" on the CONSULT screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

WARNING:

- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

⊗ Without CONSULT

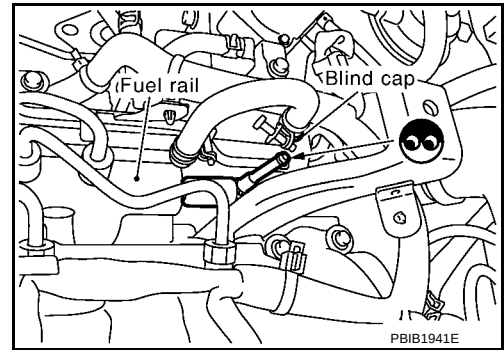
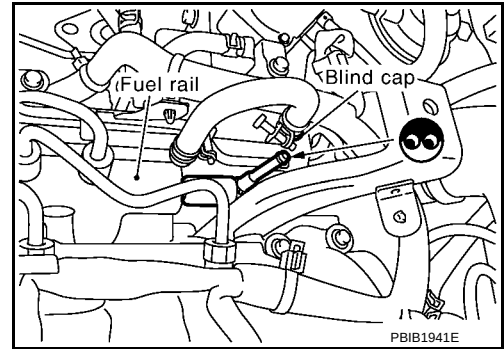
1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

WARNING:

- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel rail.



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P1273 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1273 FUEL PUMP

DTC Logic

INFOID:000000006106948

DTC DETECTION LOGIC

NOTE:

If DTC P1273 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1273	FUEL PUMP (Fuel pump insufficient flow)	ECM detects the abnormal pulse of fuel pressure.	• Harness or connectors (The fuel pump circuit is open or shorted.) • Fuel pump • Fuel pump suction control valve • Injector adjustment value • Air mixed with fuel • Lack of fuel

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 10 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1156, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106949

NOTE:

This diagnosis procedure must be used with CONSULT.

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select "ENTER INJECTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT.
3. Check injector adjustment values displayed on CONSULT screen.

The value displayed on CONSULT screen should be same as injector adjustment value printed on each injector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform "Injector Adjustment Value Registration". Refer to [EC-1040, "Work Procedure"](#).

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

Ⓑ With CONSULT

1. Turn ignition switch ON.
2. Perform "Fuel Pump Learning Value Clearing". Refer to [EC-1043, "Work Procedure"](#).

P1273 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

3. Start engine and let it idle for at least 60 seconds.
4. Select "SELF-DIAG RESULT" mode with CONSULT.
5. Touch "ERASE".
6. Perform DTC confirmation procedure, again. Refer to [EC-1156, "DTC Logic"](#).
7. Check 1st trip DTC.

Is 1st trip DTC displayed again?

- YES >> GO TO 3.
NO >> **INSPECTION END**

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	116	F100	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	103	F100	1	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1157, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)
NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084978

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

P1273 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

P1274 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1274 FUEL PUMP

DTC Logic

INFOID:000000006106951

DTC DETECTION LOGIC

NOTE:

If DTC P1274 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1274	FUEL PUMP (Fuel pump protection)	Fuel pressure is too much higher than the target value.	• Harness or connectors (The fuel pump circuit is open or shorted.) • Fuel pump • Fuel pump suction control valve • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let idle for at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1159, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106952

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	116	F100	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	103	F100	1	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

P1274 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1160, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

4.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1160, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)

NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084979

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106954

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	40 (Fuel rail pressure sensor signal)	16	Idle	1.4 – 1.7 V
			2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

P1275 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1275 FUEL PUMP

DTC Logic

INFOID:000000006106955

DTC DETECTION LOGIC

NOTE:

If DTC P1275 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1275	FUEL PUMP (Fuel pump exchange)	Fuel pressure is too much higher than the target value.	• Harness or connectors (The fuel pump circuit is open or shorted.) • Fuel pump • Fuel pump suction control valve • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1161, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106956

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	116	F100	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM harness connector and fuel pump harness connector.

ECM		Fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E212	103	F100	1	Existed

2. Also check harness for short to ground and short to power.

P1275 FUEL PUMP

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1162, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace fuel rail.

4.CHECK FUEL PUMP SUCTION CONTROL VALVE

Check fuel pump suction control valve. Refer to [EC-1162, "Component Inspection \(Fuel Pump Suction Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace fuel pump. Refer to [EM-186, "Component"](#)

NO >> Repair or replace malfunctioning part.

Component Inspection (Fuel Pump Suction Control Valve)

INFOID:000000007084980

1.CHECK FUEL PUMP SUCTION CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as follows.

Terminals	Resistance
1 and 2	1.8 – 2.4 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump suction control valve. Refer to [EM-193, "Component"](#).

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000006106958

1.CHECK FUEL RAIL PRESSURE SENSOR-I

1. Turn ignition switch OFF.
2. Reconnect all harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F115	40 (Fuel rail pressure sensor signal)	16	Idle	1.4 – 1.7 V
			2,000 rpm	1.7 – 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail. Refer to [EM-181, "Exploded View"](#).

P1409 EGR COOLER BYPASS VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1409 EGR COOLER BYPASS VALVE

DTC Logic

INFOID:000000006106959

DTC DETECTION LOGIC

NOTE:

- If DTC P1409 is displayed with DTC P0097 or P0098, perform the trouble diagnosis for DTC P0097 or P0098.
- If DTC P1409 is displayed with DTC P2426 or P2427, perform the trouble diagnosis for DTC P2426 or P2427.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1409	EGR COOLING BYPASS/V (EGR bypass valve stick)	Extremely high temperatures indicated by a signal from the IAT sensor 2 during travel.	• EGR cooler • Engine coolant leak • Charge air cooler poor radiation • TC system • Throttle valve system • EGR volume control system • Oxidation catalyst

DTC CONFIRMATION PROCEDURE

1.PERFORM DIAGNOSIS PROCEDURE

NOTE:

Since this DTC is difficult to be confirmed, check possible causes to judge the normality.

>> Proceed to [EC-1163. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106960

1.CHECK DTC

1. Check self-diagnosis results to see that the following systems have no malfunction.
 - TC system
 - Throttle valve system
 - EGR volume control valve system

Is inspection result normal?

YES >> GO TO 2.

NO >> Check error-detected system.

2.CHECK EGR COOLER BYPASS SYSTEM

Perform trouble diagnosis for EGR cooler bypass system. Refer to [EC-1198. "Component Function Check"](#).

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT LEAK

1. Turn ignition switch OFF.
2. Check that the engine coolant level is normal.
3. Check water hose and EGR cooler for clogging, cracks or improper connection.

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK CHARGE AIR COOLER

Check the charge air cooler fin for crushing and clogging.

Inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).

P1409 EGR COOLER BYPASS VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

NO >> Replace charge air cooler.

P1550, P1551, P1552, P1553, P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1550, P1551, P1552, P1553, P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000006106961

DTC DETECTION LOGIC

NOTE:

If DTC P1550, P1551, P1552, P1553 or P1554 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor circuit range/performance)	- With the signal voltage between 0.4V and 4.4V, the signal voltage from battery current sensor remains unstable for 10 seconds or more. - With the signal voltage 4.4V or more, the signal voltage from battery current sensor remains unstable for 16 seconds or more. - With the signal voltage 0.4V or less, the signal voltage from battery current sensor remains unstable for 16 minutes or more.	- Harness or connectors (Battery current sensor circuit is open or shorted.) - Battery current sensor
P1551	BAT CURRENT SENSOR (Battery current sensor circuit low input)	Signal voltage from battery current sensor remains approx. 5V for 10 seconds or more.	
P1552	BAT CURRENT SENSOR (Battery current sensor circuit high input)	Signal voltage from battery current sensor remains 0V or more for 10 seconds or more	
P1553	BAT CURRENT SENSOR (Battery current sensor performance)	The signal voltage transmitted from battery current sensor to ECM is higher than the amount of the maximum power generation.	
P1554	BAT CURRENT SENSOR (Battery current sensor performance)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and wait at least 15 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1166, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Let the engine at idle and wait for 16 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1166, "Diagnosis Procedure"](#).
NO >> INSPECTION END

P1550, P1551, P1552, P1553, P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Diagnosis Procedure

INFOID:000000006106962

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector terminals.

Battery current sensor			Voltage (Approx.)
Connector	+	−	
	terminal		
E210	1	3	5 V

Inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-II

Check the voltage between battery current sensor harness connector and ground.

+		−	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E210	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E210	1	E212	105	Existed

4. Also check harness for short to ground.

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E210	3	E212	111	Existed

Is inspection result normal?

P1550, P1551, P1552, P1553, P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).
NO >> Repair or replace error-detected parts.

6.CHECK BATTERY CURRENT SENSOR SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E210	4	E212	104	Existed

- Also check harness for short to ground and to power.

Is inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK BATTERY CURRENT SENSOR

Check battery current sensor. Refer to [EC-1167. "Component Inspection \(Battery Current Sensor\)"](#).

Is inspection result normal?

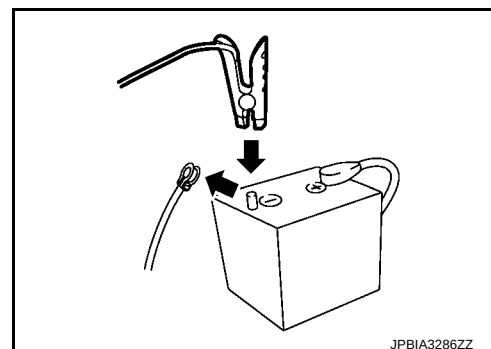
- YES >> Check intermittent incident. Refer to [EC-1038. "Description"](#).
NO >> Replace battery negative cable assembly.

Component Inspection (Battery Current Sensor)

INFOID:000000006106963

1.CHECK BATTERY CURRENT SENSOR

- Turn ignition switch OFF.
- Reconnect harness connectors disconnected.
- Disconnect battery negative cable.
- Install jumper cable between battery negative terminal and body ground.
- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals under the following conditions.



JPBIA3286ZZ

P1550, P1551, P1552, P1553, P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ECM			Voltage (Approx.)
Connector	+	-	
	Terminal	Terminal	
E212	104 (Battery current sensor signal)	111	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4, "How to Handle Battery"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:000000006106964

DTC DETECTION LOGIC

NOTE:

If DTC P1556 or P1557 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	• Harness or connectors (Battery temperature sensor circuit is open or shorted.) • Battery temperature sensor
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1169, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106965

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector terminals.

Battery current sensor			Voltage (Approx.)
Connector	+	−	
	terminal		
E210	2	3	5 V

Inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E210	2	Ground	5 V

P1556, P1557 BATTERY TEMPERATURE SENSOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Is inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E210	2	E212	117	Existed

4. Also check harness for short to ground.

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E210	3	E212	111	Existed

Is inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E212	97	Ground	Existed
	98		
	99		
	100		
	114		

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Repair or replace error-detected parts.

6.CHECK BATTERY TEMPERATURE SENSOR

Check battery temperature sensor. Refer to [EC-1171, "Component Inspection \(Battery Temperature Sensor\)"](#).

Is inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (Battery Temperature Sensor)

INFOID:000000006106966

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect battery current sensor.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Resistance
+	−	
Terminal		
2	3	continuity with the resistance value 100 Ω or more

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

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P1622 INJECTOR ADJUSTMENT VALUE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1622 INJECTOR ADJUSTMENT VALUE

DTC Logic

INFOID:000000006106967

DTC DETECTION LOGIC

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1622	INJ ADJ VAL UNRGST (Injector adjustment value data non-registration)	Injector adjustment value is not stored in ECM.	Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1172, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106968

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform "Injector Adjustment Value Registration". Refer to [EC-1040, "Work Procedure"](#).

>> INSPECTION END

P1623 INJECTOR ADJUSTMENT VALUE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1623 INJECTOR ADJUSTMENT VALUE

DTC Logic

INFOID:000000006106969

DTC DETECTION LOGIC

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1623	INJ ADJ VAL ERROR (Injector adjustment value data error)	ECM detects the abnormal value of injector adjustment value.	- CONSULT communication status (The status of CONSULT communication becomes improper during Injector Adjustment Value Registration.) - ECM

NOTE:

This DTC is not detected when injector adjustment value (not correct but existent) is stored in ECM.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1173, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106970

NOTE:

This diagnosis procedure must be used with CONSULT.

1. CHECK INJECTOR ADJUSTMENT VALUE

- Turn ignition switch ON.
- Select "ENTER INJECTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT.
- Check injector adjustment values displayed on CONSULT screen.

The value displayed on CONSULT screen should be same as injector adjustment value printed on each injector.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform "Injector Adjustment Value Registration". Refer to [EC-1040, "Work Procedure"](#).

2. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform "Injector Adjustment Value Registration". Refer to [EC-1040, "Work Procedure"](#).

NOTE:

When two or more injector adjustment value are improper, it is useful to perform "INJ ADJ VAL CLR" in "WORK SUPPORT" mode with CONSULT. And then perform "Injector Adjustment Value Registration".

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

- Select "SELF DIAG RESULTS" mode with CONSULT.

P1623 INJECTOR ADJUSTMENT VALUE

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

2. Touch "ERASE".
3. Perform DTC confirmation procedure, again. Refer to [EC-1173, "DTC Logic"](#).
4. Check DTC.

Is the DTC displayed again?

- YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> **INSPECTION END**

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P1805 BRAKE SWITCH

DTC Logic

INFOID:000000006106971

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SWITCH (Brake switch)	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Since this DTC is difficult to be confirmed, check component function to judge the normality.

>> Proceed to [EC-1175. "Component Function Check"](#).

Component Function Check

INFOID:000000006106972

1.CHECK BRAKE SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

+		−	Condition		Voltage
ECM					
Connec- tor	Terminal				
E212	136	Ground	Brake pedal	Slightly de- pressed	Battery voltage
				Fully released	Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1175. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106973

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E109 (A/T)	1	Ground	Battery voltage
E116 (M/T)			

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to [EC-1176, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace stop lamp switch.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E109 (A/T)	2	E212	136	Existed
E116 (M/T)				

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Stop Lamp Switch)

INFOID:000000006106974

1.CHECK STOP LAMP SWITCH

1. Adjust stop lamp switch installation. Refer to [BR-5, "Inspection and Adjustment"](#).
2. Turn ignition switch OFF.
3. Disconnect stop lamp switch harness connector.
4. Check the continuity between stop lamp switch terminals under the following conditions.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:000000006106975

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2118	ETC MOT (Throttle control motor)	Excessively high duty voltage signal is sent to the valve for the specified time.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control valve stuck open or stuck close • Electric throttle control actuator (Throttle control motor) • Electric throttle control position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 30 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 1 second.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> INSPECTION END

NO >> Proceed to [EC-1178, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106976

1.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector and ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	5	E212	153	Existed
			140	Not existed
	6		153	Not existed
			140	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.CHECK THROTTLE CONTROL MOTOR

Check throttle control motor. Refer to [EC-1179, "Component Inspection \(Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace electric throttle control actuator. Refer to [EM-164, "Removal and Installation"](#).

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Component Inspection (Throttle Control Motor)

INFOID:000000006106977

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 0.3 - 100 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to [EM-164, "Removal and Installation"](#).

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:000000006106978

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2119	ETC ACTR (Throttle control actuator)	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> INSPECTION END

NO >> Refer to [EC-1180. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106979

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to [EM-164. "Removal and Installation"](#).

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

P2135 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2135 APP SENSOR

DTC Logic

INFOID:000000006106980

DTC DETECTION LOGIC

MIL will not light up for this self-diagnosis.

NOTE:

- If DTC P2135 is displayed with DTC P0642 or P0643, perform the trouble diagnosis for DTC P0642 or P0643. Refer to [EC-1135, "DTC Logic"](#).
- If DTC P2135 is displayed with DTC P0652 or P0653, perform the trouble diagnosis for DTC P0652 or P0653. Refer to [EC-1137, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2135	APP SENSOR (Accelerator pedal position sensor 1, 2 signal correlation)	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	• Harness or connectors (The APP sensor circuit is open or shorted.) • Accelerator pedal position sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1181, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106981

1. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E108	1	Ground	Approx. 5 V
	2		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

P2135 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	4	E212	108	Existed
	5		121	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E108	3	E212	107	Existed
	6		120	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR

Check APP sensor. Refer to [EC-1182, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace accelerator pedal assembly. Refer to [ACC-3, "Component"](#).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006106982

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector.

(+) (V)		(-)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E212	107 (APP sensor 1 signal)	E212	108	Accelerator pedal	Fully released	0.65 - 0.87 V
					Fully depressed	More than 4.3 V
E212	120 (APP sensor 2 signal)	E212	121	Accelerator pedal	Fully released	0.28 - 0.48 V
					Fully depressed	More than 2.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly.

P2146, P2149 FUEL INJECTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2146, P2149 FUEL INJECTOR POWER SUPPLY

DTC Logic

INFOID:000000006106983

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2146	INJ PWR/CIRC (No. 1 and 4 cylinder fuel injector power supply circuit open)	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	• Harness or connectors (The fuel injector circuit is open.)
P2149	INJ PWR/CIRC (No. 2 and 3 cylinder fuel injector power supply circuit open)	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1183, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106984

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect fuel injector harness connector.
- Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F13	1	F115	73	Existed
2	F16	1		1	
3	F14	1		25	
4	F15	1		49	

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

P2147, P2148 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2147, P2148 FUEL INJECTOR

DTC Logic

INFOID:0000000006106985

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2147	INJECTOR/CIRC (Fuel injector circuit low input)	ECM detects the fuel injector circuit is shorted to ground.	• Harness or connectors (The fuel injector circuit is shorted.)
P2148	INJECTOR/CIRC (Fuel injector circuit high input)	ECM detects the fuel injector circuit is shorted to power.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Refer to [EC-1184, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006106986

Perform the trouble diagnosis for fuel injector circuit. Refer to [EC-1193, "Diagnosis Procedure"](#).

P2150, P2151 ECM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2150, P2151 ECM

DTC Logic

INFOID:000000006106987

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2150	FUEL INJ GROUP B (COM2 power supply voltage circuit low)	ECM detects a voltage of internal power source circuit for the IC is excessively low.	ECM
P2151	FUEL INJ GROUP B (COM2 power supply voltage circuit high)	ECM detects a voltage of internal power source circuit for the IC is excessively high.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
3. Repeat steps 2 and 3 at least 48 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1185, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106988

1. REPLACE ECM

NOTE:

Replace ECM if this DTC is detected.

>> Replace ECM.

P2228, P2229 BARO SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2228, P2229 BARO SENSOR

DTC Logic

INFOID:000000006106989

DTC DETECTION LOGIC

MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2228	BARO SEN/CIRC (Barometric pressure sensor circuit low input)	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	BARO sensor (built-into ECM)
P2229	BARO SEN/CIRC (Barometric pressure sensor circuit high input)	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1186, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106990

1. DTC CONFIRMATION

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-1186, "DTC Logic"](#).
4. Check the DTC.

Is the DTC displayed again?

YES >> Replace ECM. Refer to [EC-1218, "Removal and Installation"](#).
NO >> INSPECTION END

P2426, P2427 EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2426, P2427 EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000006106993

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2426	EGR COOLING VALVE (EGR cooler bypass valve control solenoid valve cir- cuit)	Short circuit between ECM and the EGR cooler bypass valve control sole- noid valve circuit ground continues for 2 seconds or more.	• Harness or connectors (EGR cooler bypass valve control solenoid valve circuit is open or shorted.) • EGR cooler bypass valve control solenoid valve
P2427		Short circuit between ECM and the battery power supply of the EGR cool- er bypass valve control solenoid valve circuit continues for 2 seconds or more.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1187. "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to normal operating temperature.
2. Keep the engine speed above 2,500 rpm for 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1187. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006106994

1. CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR cooler bypass valve control solenoid valve harness connector and ground.

+		-	Voltage
EGR cooler bypass valve control solenoid valve			
Connector	Terminal		
F109	2	Ground	Battery voltage

5. Also check harness for short to ground.

P2426, P2427 EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Is inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR cooler bypass valve harness connector and ECM harness connector.

+		-		Continuity
EGR cooler bypass valve control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F109	1	F115	71	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Perform [EC-1199, "Component Inspection \(EGR Cooler Bypass Valve Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace EGR cooler bypass valve control solenoid valve. Refer to [EM-159, "Exploded View"](#).

Component Inspection (EGR Cooler Bypass Valve Control Solenoid Valve) INFOID:000000006106995

1.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
3. Check the resistance between EGR cooler bypass valve control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	43 – 49 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR cooler bypass valve control solenoid valve. Refer to [EM-159, "Exploded View"](#).

P2478 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2478 EGT SENSOR 1

DTC Logic

INFOID:000000007085977

NOTE:

VIN ≥ VSK***D40**393615

DTC DETECTION LOGIC

NOTE:

If DTC P2478 is detected with a diagnosis result of EGT sensor 1, perform EGT sensor 1 diagnosis first.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2478	EGT SENSOR (EGT sensor 1 out of range)	Exhaust gas temperature around the turbocharger exhaust side entrance remains 862°C (1584°F) or more for 2 seconds or more.	• Charge air system • EGT sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and drive the vehicle with the constant accelerator pedal depression to maintain a constant vehicle speed for 5 seconds.

CAUTION:

Always drive safely.

NOTE:

- Never allow engine speed to be changed by 2 rpm/s or more.
- Vehicle speed and engine speed can be set arbitrarily.
- For better results, drive under high-load conditions.

3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1189, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000007085978

1. CHECK FOR CHARGE AIR LEAK

1. Start engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2. CHECK EGT SENSOR 1

1. Check the installation condition of EGT sensor 1.
2. Remove EGT sensor 1 and visually check for malfunction.

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

P247A EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P247A EGT SENSOR 1

DTC Logic

INFOID:000000006291345

NOTE:

VIN < VSK***D40**393615

DTC DETECTION LOGIC

NOTE:

If DTC P247A is detected with a diagnosis result of EGT sensor 1, perform EGT sensor 1 diagnosis first.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P247A	EGT SENSOR (EGT sensor 1 out of range)	Exhaust gas temperature around the turbocharg- erexhaust side entrance remains 862°C (1584°F) or more for 2 seconds or more.	• Charge air system • EGT sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and drive the vehicle with the constant accelerator pedal depression to maintain a constant vehicle speed for 5 seconds.

CAUTION:

- Always drive safely.

NOTE:

- Never allow engine speed to be changed by 2 rpm/s or more.
- Vehicle speed and engine speed can be set arbitrarily.
- For better results, drive under high-load conditions.

3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC-1190, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006291346

1.CHECK FOR CHARGE AIR LEAK

1. Start engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 2.

2.CHECK EGT SENSOR 1

1. Check the installation condition of EGT sensor 1.
2. Remove EGT sensor 1 and visually check for malfunction.

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace error-detected parts.

P2621, P2622 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

P2621, P2622 TP SENSOR

DTC Logic

INFOID:000000006106998

DTC DETECTION LOGIC

NOTE:

If DTC P2621 or P2622 is display with DTC P0642 or P0643, perform the trouble diagnosis for DTC P0642 or P0643. Refer to [EC-1135, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2621	TP SEN/CIRCUIT (Throttle position sensor circuit low)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connector (Throttle position sensor circuit is open or shorted.) • Electric throttle control actuator (Throttle position sensor)
P2622	TP SEN/CIRCUIT (Throttle position sensor circuit high)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> INSPECTION END

NO >> Proceed to [EC-1191, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006106999

1. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F106	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	4	F115	12	Existed

4. Also check harness for short to ground and short to power.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	1	F115	36	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to [EC-1192, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace electric throttle control actuator. Refer to [EM-164, "Removal and Installation"](#).

Component Inspection (Throttle Position Sensor)

INFOID:000000006107000

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "TARGET ETC ANGLE" in "ACTIVE TEST" mode, and select "THRTL SEN" as the monitor item with CONSULT.
5. Check indication under the following conditions.

Condition		THRTL SEN (V)
TARGET ETC ANGLE (°)	0.0	0.33 – 0.87
	84.0	3.35 – 4.55

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-164, "Removal and Installation"](#).

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

FUEL INJECTOR

Diagnosis Procedure

INFOID:000000006107001

1.CHECK FUEL INJECTOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector terminals.

Fuel injector				Voltage
Cylinder	Connector	+	–	
		Terminal		
1	F13	1	2	Battery voltage
2	F16			
3	F14			
4	F15			

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY-II

Check the voltage between fuel injector harness connector and ground.

+			-	Voltage
Fuel injector				
Cylinder	Connector	Terminal		
1	F13	1	Ground	Battery voltage
2	F16			
3	F14			
4	F15			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK FUEL INJECTOR INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Cylinder	+		-		Continuity
	Fuel injector		ECM		
	Connector	Terminal	Connector	Terminal	
1	F13	1	F115	73	Existed
2	F16			1	
3	F14			25	
4	F15			49	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply.

FUEL INJECTOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

4.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Cylinder	+		-		Continuity
	Fuel injector		ECM		
	Connector	Terminal	Connector	Terminal	
1	F13	2	F115	74	Existed
2	F16			3	
3	F14			26	
4	F15			51	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair or replace error-detected parts.

5.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1195, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning fuel injector.

6.PERFORM FUEL INJECTION QUANTITY LEARNING

With CONSULT

Perform fuel injection quantity learning. Refer to [EC-1041, "Work Procedure"](#).

Did the learning complete successfully?

YES >> GO TO 8.

NO-1 (learning not succeeded)>>Record the cylinder unsuccessful in learning. And then, GO TO 7.

NO-2 (other case)>>Check error-detected parts.

7.PERFORM FUEL INJECTION QUANTITY LEARNING AGAIN

With CONSULT

Perform fuel injection quantity learning again. Refer to [EC-1041, "Work Procedure"](#).

Did the learning complete successfully?

YES >> GO TO 8.

NO-1 (the same cylinder unsuccessful in learning at Step 9 was again unsuccessful)>>Replace malfunctioning fuel injector.

NO-2 (other cases)>>GO TO 9.

8.RECHECK MALFUNCTION SYMPTOM

Reproduce malfunction indicated by the customer.

Has the malfunction been eliminated?

YES >> INSPECTION END

NO >> GO TO 9.

9.CHECK INDICATED VALUE ON DATA MONITOR

With CONSULT

Check the following items with CONSULT "DATA MONITOR" to see that the indicated value is within the specified value.

FUEL INJECTOR

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

Data monitor item	specified value
INJ Q/L CYL 1-A	-0.067 – 0.090
INJ Q/L CYL 2-A	
INJ Q/L CYL 3-A	
INJ Q/L CYL 4-A	
INJ Q/L CYL 1-B	-0.032 – 0.053
INJ Q/L CYL 2-B	
INJ Q/L CYL 3-B	
INJ Q/L CYL 4-B	
INJ Q/L CYL 1-C	-0.018 – 0.038
INJ Q/L CYL 2-C	
INJ Q/L CYL 3-C	
INJ Q/L CYL 4-C	
INJ Q/L CYL 1-D	-0.017 – 0.034
INJ Q/L CYL 2-D	
INJ Q/L CYL 3-D	
INJ Q/L CYL 4-D	

Is the indicated value within the specified value?

- YES >> Check to see if there is a malfunction other than in the fuel injector.
 NO >> Replace malfunctioning fuel injector.

Component Inspection (Fuel Injector)

INFOID:000000006107002

1.CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- Check resistance between fuel injector terminals as follows.

Terminal	Resistance
1 and 2	0.2 - 0.8 Ω [at 10 – 60°C (50 – 140°F)]

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace fuel injector. Refer to [EM-181. "Exploded View"](#).

GLOW CONTROL SYSTEM

Diagnosis Procedure

INFOID:000000006107003

1.CHECK INSTALLATION

Check that glow plug connectors are installed properly.

Are glow plug connectors installed properly?

YES >> GO TO 2.

NO >> Install properly.

2.CHECK DTC

Check DTC.

Is DTC detected?

YES >> Perform trouble diagnoses for detected DTC. Refer to [EC-970, "DTC Index"](#).

NO >> GO TO 3.

3.CHECK HARNESS CONTINUITY BETWEEN GLOW CONTROL UNIT AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow control unit harness connector and glow plug connectors.
2. Check harness continuity between glow control unit harness connector and glow plug connectors.

Glow control unit		Glow plug		Continuity
Connector	Terminal	Connector	Terminal	
E235	2	F102 (No. 1)	1	Existed
	7	F103 (No. 2)	1	
	1	F104 (No. 3)	1	
	6	F105 (No. 4)	1	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW PLUG

Check glow plug. Refer to [EC-1196, "Component Inspection \(Glow Plug\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace glow plug.

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace glow control unit.

NO >> INSPECTION END

Component Inspection (Glow Plug)

INFOID:000000006107004

CAUTION:

- Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.
- If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.
- If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.
- Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.

GLOW CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

1.CHECK GLOW PLUG

1. Disconnect glow plug connectors.
2. Check resistance glow plug terminal and glow plug stem.

Terminals	Resistance
1 and glow plug stem	Approx. 0.2 – 0.5 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning glow plug. Refer to [EM-178. "Component"](#).

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EGR COOLER BYPASS SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

EGR COOLER BYPASS SYSTEM

Component Function Check

INFOID:000000006107005

1.CHECK EGR BYPASS VALVE FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "EGR COOLER BYPASS VALVE" in "ACTIVE TEST" mode with CONSULT.
3. Activate the TC boost control actuator and visually check the rod movement.

Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Activate the EGR cooler bypass valve according to the following condition and visually check the rod movement.

Condition	EGR cooler bypass valve
Engine speed: at idle	ON (bypass mode)
Engine speed: above 2,500 rpm (no load)	OFF (cooler mode)

Is inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1198, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006107006

1.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR cooler bypass valve control solenoid valve harness connector and ground.

+		-	Voltage
EGR cooler bypass valve control solenoid valve			
Connector	Terminal		
F109	2	Ground	Battery voltage

5. Also check harness for short to ground.

Is inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR cooler bypass valve harness connector and ECM harness connector.

+		-		Continuity
EGR cooler bypass valve control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F109	1	F115	71	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 3.

EGR COOLER BYPASS SYSTEM

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

3.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Check EGR cooler bypass valve control solenoid valve. Refer to [EC-1199, "Component Inspection \(EGR Cooler Bypass Valve Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace EGR cooler bypass valve control solenoid valve. Refer to [EM-159, "Exploded View"](#)

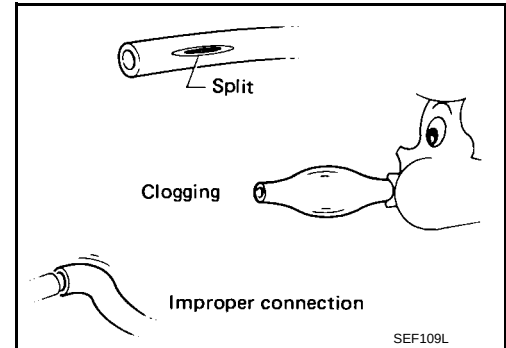
4.CHECK VACUUM HOSE AND VACUUM GALLERY

Check vacuum hose and vacuum gallery for clogging, cracks or improper connection.

Is inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.



5.CHECK EGR COOLER BYPASS VALVE

Check EGR cooler bypass valve. Refer to [EC-1199, "Component Inspection \(EGR Cooler Bypass Valve\)"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace EGR cooler assembly. Refer to [EM-159, "Exploded View"](#).

Component Inspection (EGR Cooler Bypass Valve Control Solenoid Valve) INFOID:000000006107007

1.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
3. Check the resistance between EGR cooler bypass valve control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	43 – 49 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR cooler bypass valve control solenoid valve. Refer to [EM-159, "Exploded View"](#).

Component Inspection (EGR Cooler Bypass Valve) INFOID:000000006107008

1.CHECK EGR COOLER BYPASS VALVE

1. Install a vacuum pump to EGR cooler bypass diaphragm.
2. Check that a vacuum is kept when applying the vacuum to EGR cooler bypass diaphragm.

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR cooler assembly. Refer to [EC-1038, "Description"](#).

HEAT UP SWITCH

Diagnosis Procedure

INFOID:000000006107009

1.CHECK OVERALL FUNCTION

1. Start the engine.
2. Check engine speed and heat up switch indicator under the following condition.
 - Air conditioner switch: OFF
 - Electric load: OFF (Lights, heater fan & rear window defogger)
 - Steering wheel: Kept in straight-ahead position
 - Selector lever: P or N (A/T)
 - Control lever: Neutral (M/T)
 - Accelerator pedal: Fully released

Condition		Engine speed	Heat up switch indicator
Heat up switch	OFF	Approx. 750 rpm	OFF
	ON	Approx. 1400 rpm	ON

Is the inspection result normal?

YES >> **INSPECTION END**

NO-1 >> Engine speed does not increase: GO TO 2.

NO-2 >> The indicator does not illuminate: GO TO 4.

NO-3 >> Both items do not operate: GO TO 5.

2.CHECK HEAT UP SWITCH INPUT SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "WARM UP SW" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

Monitor Item	Condition		Indication
WARM UP SW	Heat up switch	OFF	OFF
		ON	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connec-tor	Terminal				
F115	83	Ground	Heat up switch	OFF	Approx. 0 V
				ON	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> GO TO 3.

3.CHECK HEAT UP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and heat up switch harness connector.
3. Check the continuity between ECM harness connector and heat up switch harness connector.

HEAT UP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ECM		Heat up switch		Continuity
Connector	Terminal	Connector	Terminal	
F115	83	M12	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HEAT UP SWITCH INDICATOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heat up switch harness connector.
3. Check the continuity between heat up switch harness connector and ground.

Heat up switch		Ground	Continuity
Connector	Terminal		
M12	2	Ground	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit in harness or connectors.

5.CHECK HEAT UP SWITCH POWER SUPPLY CIRCUIT

1. Turn heat up switch OFF.
2. Turn ignition switch OFF.
3. Disconnect heat up switch harness connector.
4. Turn ignition switch ON.
5. Check voltage between heat up switch harness connector and ground.

Heat up switch		Ground	Voltage
Connector	Terminal		
M12	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair power supply circuit.

6.CHECK HEAT UP SWITCH

Check heat up switch. Refer to [EC-1201, "Component Inspection \(Heat Up Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace heat up switch. Refer to [EC-1201, "Component Inspection \(Heat Up Switch\)"](#).

Component Inspection (Heat Up Switch)

INFOID:000000006107010

1.CHECK HEAT UP SWITCH

1. Disconnect heat up switch harness connector.
2. Check continuity between heat up switch terminals 1 and 2 under the following conditions.

Terminals		Condition		Continuity
1	2	Heat up switch	OFF	Not existed
			ON	Existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heat up switch.

HEAT UP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

2. CHECK HEAT UP SWITCH INDICATOR

1. Disconnect heat up switch harness connector.
2. Check continuity between heat up switch terminals under the following conditions.

Terminals		Continuity
+	-	
4	2	Not existed
2	4	Existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace heat up switch.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:000000006107011

1.CHECK OVERALL FUNCTION

With CONSULT

1. Start the engine.
2. Select "AC PRESS SEN" in "DATA MONITOR" mode with CONSULT.
3. Turn A/C switch and blower fan switch ON.
4. Check the monitor status.

Monitor Item	Indication
AC PRESS SEN	1.0 – 4.0 V

Without CONSULT

1. Start the engine.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F115	37	Ground	Approx. 1.0 - 4.0 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE

Check refrigerant pressure. Refer to [ATC-197, "Insufficient Cooling"](#).

Is the inspection result normal?

- YES >> Proceed to [EC-1203, "Diagnosis Procedure"](#).
NO >> Repair refrigerant system.

Diagnosis Procedure

INFOID:000000006107012

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect refrigerant pressure sensor harness connector and ECM harness connector.
3. Turn ignition switch ON.
4. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F115	20	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	1	F115	13	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Harness for open or short between ECM and refrigerant pressure sensor.

3. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	2	F115	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to [ATC-247, "Removal and Installation for Refrigerant Pressure Sensor"](#).

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

PARK/NEUTRAL POSITION SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

PARK/NEUTRAL POSITION SWITCH

A/T

A/T : Diagnosis Procedure

INFOID:000000006107013

EC

1.CHECK P/N SWITCH INPUT SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

Monitor Item	Condition		Indication
P/N POSI SW	Selector lever position	P or N	ON
		Except P or N	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connec-tor	Terminal				
F212	151	Ground	Selector lever position	P or N	Approx. 0 V
				Except P or N	Battery voltage

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-97, "CONSULT Function \(TRANSMISSION\)"](#).

Is DTC detected?

YES >> Perform trouble shooting relevant to DTC indicated.

NO >> GO TO 3.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM harness connector and combination meter harness connector.

ECM		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
E212	151	M23	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect A/T assembly harness connector.
2. Check harness continuity between A/T assembly harness connector and combination meter harness connector.

PARK/NEUTRAL POSITION SWITCH

[YD25DDTi]

< DTC/CIRCUIT DIAGNOSIS >

A/T assembly		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
F36	9	M23	17	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between A/T assembly harness connector and TCM harness connector.

A/T assembly		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F36	9	F502	8	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).

NO >> Repair or replace malfunctioning parts.

M/T

M/T : Diagnosis Procedure

INFOID:000000006107014

1.CHECK PARK/NEUTRAL POSITION SWITCH INPUT SIGNAL

With CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
3. With operating the brake pedal, check the monitor status.

Monitor Item	Condition		Indication
P/N POSI SW	Control lever position	Neutral	ON
		Except Neutral	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F212	151	Ground	Control lever position	Neutral	Approx. 0 V
				Except Neutral	Battery voltage

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> GO TO 2.

PARK/NEUTRAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

2. CHECK PARK/NEUTRAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position switch harness connector.
3. Check harness continuity between park/neutral position switch harness connector and ground.

Park/neutral position switch		Ground	Continuity
Connector	Terminal		
F117	2	Ground	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit in harness or connectors.

3. CHECK PARK/NEUTRAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM harness connector and park/neutral position switch harness connector.

ECM		Park/neutral position switch		Continuity
Connector	Terminal	Connector	Terminal	
E212	151	F117	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PARK/NEUTRAL POSITION SWITCH

Check park/neutral position switch. Refer to [MT-13, "Checking"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Replace park/neutral position switch.

START SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

START SIGNAL

Component Function Check

INFOID:000000006107015

1.CHECK START SIGNAL INPUT

With CONSULT

1. Turn ignition switch ON.
2. Select "START SIGNAL" in "DATA MONITOR" mode with CONSULT.
3. Check the monitor status.

Monitor Item	Condition		Indication
START SIGNAL	Ignition switch	ON	OFF
		START	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Conne- tor	Terminal				
F212	150	Ground	Ignition switch	ON	Approx. 0 V
				START	Battery voltage

Is the inspection result normal?

YES >> **INSPECTION END**

NO >> Refer to [EC-1208, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006107016

1.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
J/B	#2	10A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> GO TO 2.

2.CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM harness connector and ignition switch harness connector.

ECM		Ignition switch		Continuity
Connector	Terminal	Connector	Terminal	
E212	150	M33	6	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [EC-1038, "Description"](#).

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

ASCD INDICATOR

< DTC/CIRCUIT DIAGNOSIS >

[YD25DDTi]

ASCD INDICATOR

Component Function Check

INFOID:000000006107017

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON	• ASCD: Operating	ON
	• When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to [EC-1209, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006107018

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH COMBINATION METER

Check dtc with combination meter. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [EC-1038, "Description"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).

NO >> Repair or replace malfunctioning part.

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:000000006107019

SYSTEM — BASIC ENGINE CONTROL SYSTEM

	Warranty symptom code	SYMPTOM																							Refer- ence																										
		NO START (with first firing)				HARD/NO START/RESTART (EXCP. HA)			ENGINE STALL																																										
		NO START (without first firing)				HARD TO START WHEN ENGINE IS COLD			HARD TO START WHEN ENGINE IS HOT			AT IDLE			DURING DRIVING			WHEN DECELERATING			HESITATION/SURGING/FLAT SPOT																														
																					KNOCK/DETONATION																														
																					LACK OF POWER																														
Fuel pump circuit	4	AA				AB			AC			AD			AE			AF			AG			AH			AJ			AK			AL			AM			AP			HA			EC- 1055 EC- 1058 EC- 1132 EC- 1152 EC- 1159 EC- 1161						
Fuel injector circuit	1	AA				AB			AC			AD			AE			AF			AG			AH			AJ			AK			AL			AM			AP			HA			EC- 1085 EC- 1183 EC- 1184 EC- 1193						

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

	SYMPTOM																			Refer- ence	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL																
																					ENGINE STALL
NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BLACK SMOKE	WHITE SMOKE	ABNORMAL SMOKE COLOR
DEAD BATTERY (UNDER CHARGE)																					
Warranty symptom code	AA				AB			AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	AP	HA		
Fuel injector adjustment value registration								1	1	1	1			1	1				1	1	EC-1041 EC-1172 EC-1173
Mass air flow sensor circuit								1		1	1								1		EC-1068 EC-1072
Engine coolant temperature circuit			1		1		1			1			1	1		1			1		EC-1077
Vehicle speed signal circuit											1										EC-1114
Accelerator pedal position sensor circuit								1		1	1				1						EC-1079 EC-1181
Fuel rail pressure sensor circuit	1	1	1	1						1				1					1		EC-1083
Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			1	1						EC-1097
Camshaft position sensor circuit			3	3						3											EC-1099
Turbocharger boost sensor circuit								1		1	1										EC-1093 EC-1144

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ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

	SYMPTOM																						Refer- ence			
	NO START (with first firing) NO START (without first firing) HARD TO START WHEN ENGINE IS COLD HARD TO START WHEN ENGINE IS HOT				HARD/NO START/RESTART (EXCP. HA)			ENGINE STALL			HESITATION/SURGING/FLAT SPOT KNOCK/DETONATION LACK OF POWER POOR ACCELERATION HI IDLE LOW IDLE ROUGH IDLE/HUNTING IDLING VIBRATION SLOW/NO RETURN TO IDLE OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE EXCESSIVE FUEL CONSUMPTION EXCESSIVE OIL CONSUMPTION BLACK SMOKE WHITE SMOKE DEAD BATTERY (UNDER CHARGE)															
Warranty symptom code	AA				AB			AC	AD	AE		AF		AG	AH	AJ	AK	AL	AM	AP		HA				
Turbocharger boost control actuator cir- cuit								1		1	1										1	1	EC-1091			
Start signal circuit	1	1	1	1	1		1	1		1	1												EC-1208			
Ignition switch circuit		1			1	1	1																EC-1046			
Heat up switch cir- cuit												1											EC-1200			
Power supply for ECM circuit		1			1	1	1																EC-1046			
EGR volume control circuit								1		1	1										1		EC-1104			
EGR cooler bypass valve control sole- noid valve																		3			1		EC-1106 EC-1108			
Glow control circuit	1	1	1	1																		1	EC-1196			
Intake air tempera- ture sensor 2 circuit																							—			
Exhaust gas tem- perature sensor 1 circuit																							—			
Exhaust gas pres- sure sensor 1 circuit								1		1	1												EC-1110			
Throttle position sensor circuit																							—			

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

	SYMPTOM																						Refer- ence
	NO START (with first firing)				HARD/NO START/RESTART (EXCP. HA)																		
	NO START (without first firing)				HARD TO START WHEN ENGINE IS COLD																		
	HARD TO START WHEN ENGINE IS HOT																						
	AT IDLE				ENGINE STALL																		
	DURING DRIVING																						
	WHEN DECELERATING																						
	HESITATION/SURGING/FLAT SPOT																						
	KNOCK/DETONATION																						
	LACK OF POWER																						
POOR ACCELERATION																							
HI IDLE																							
LOW IDLE																							
ROUGH IDLE/HUNTING																							
IDLING VIBRATION																							
SLOW/NO RETURN TO IDLE																							
OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE																							
EXCESSIVE FUEL CONSUMPTION																							
EXCESSIVE OIL CONSUMPTION																							
BLACK SMOKE				ABNORMAL SMOKE COLOR																			
WHITE SMOKE																							
DEAD BATTERY (UNDER CHARGE)																							
Warranty symptom code	AA				AB			AC	AD	AE		AF		AG	AH	AJ	AK	AL	AM	AP		HA	
Refrigerant pressure sensor circuit					2	2	2					3	3			3		4					EC-1203
ECM relay (Self-shutoff) circuit		1				1	1	1															EC-1140
ECM	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1130 EC-1131 EC-1185

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

	SYMPTOM																						Refer- ence			
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL																			ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BLACK SMOKE	WHITE SMOKE					
Warranty symptom code	AA				AB			AC	AD	AE		AF		AG	AH	AJ	AK	AL	AM	AP		HA				
Fuel pump	5	5	5	5	5	5	5	5		5	5		5	5	5	5		5			5			EC-1055 EC-1055 EC-1061		
Fuel filter	1	1	1	1						1											1			MA-43		
Fuel injector	3	3	3	3	3	3	3	3	3	4	4	3	3	3	3	3		4			3	3		EC-1193		
Glow control system	1	1	1	1					1													1		EM-178 EC-1102		
Engine body	3	3	3	3	3	3	3		3	4	4		3		3	3	3	3	1		3			EM-271		
EGR system										3	3										3			EM-159		
Air cleaner and duct										3	3										3			EM-157		
Electric throttle control actuator	2	2	2	2	1	1	1			1	1													EC-1180		
Fuel rail pressure relief valve	3	3	3	3	3	3	3	3		3	3		3	3	3	3		3			3			EC-1061 FL-15		
NATS (Nissan Anti-theft System)		1																						BL-76		

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[YD25DDTi]

NORMAL OPERATING CONDITION

Description

INFOID:000000006107020

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,800 rpm under no load (for example, the shift position is park or neutral engine speed is over 2,800 rpm) fuel is cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut is operated until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under [EC-929, "FUEL INJECTION CONTROL SYSTEM : System Description"](#).

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PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:000000006107021

1. CHECK IDLE SPEED

With CONSULT

Check "CKPS·PRM(TDC)" in "DATA MONITOR" mode with CONSULT.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

CRANKCASE VENTILATION SYSTEM

< PERIODIC MAINTENANCE >

[YD25DDTi]

CRANKCASE VENTILATION SYSTEM

Inspection

INFOID:000000006107022

1.CHECK LEAKAGE

Check hoses and hose connections for leakage.

Does leakage detect?

Yes >> Repair hose connection or replace the leaked hose,
NO >> GO TO 2.

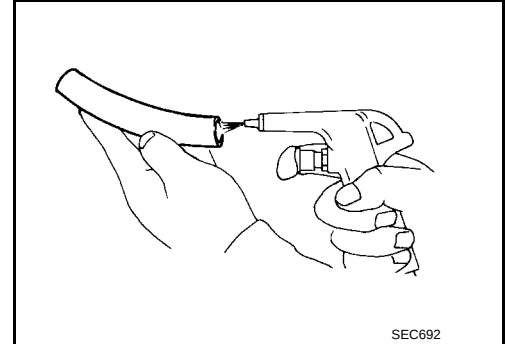
2.CLEAN HOSE

Disconnect all hoses and clean with compressed air.

NOTE:

If any hose cannot be freed of obstructions, replace the hose.

>> END



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REMOVAL AND INSTALLATION

ECM

Removal and Installation

INFOID:000000006107023

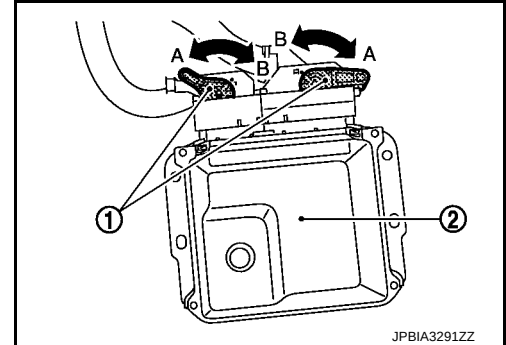
REMOVAL

1. Disconnect ECM harness connector.

NOTE:

Loosen ECM harness connector, with levers as far as they will go as shown in the figure.

1. Levers
2. ECM
- A. Fasten
- B. Loosen



2. Remove IPDM E/R and IPDM E/R covers. Refer to [PG-34, "Removal and Installation of IPDM E/R"](#). (LHD models)
3. Remove Fuse and fusible link box. (RHD models)
4. Remove the fix bolts. And then remove ECM.

INSTALLATION

Install in the reverse order of removal.

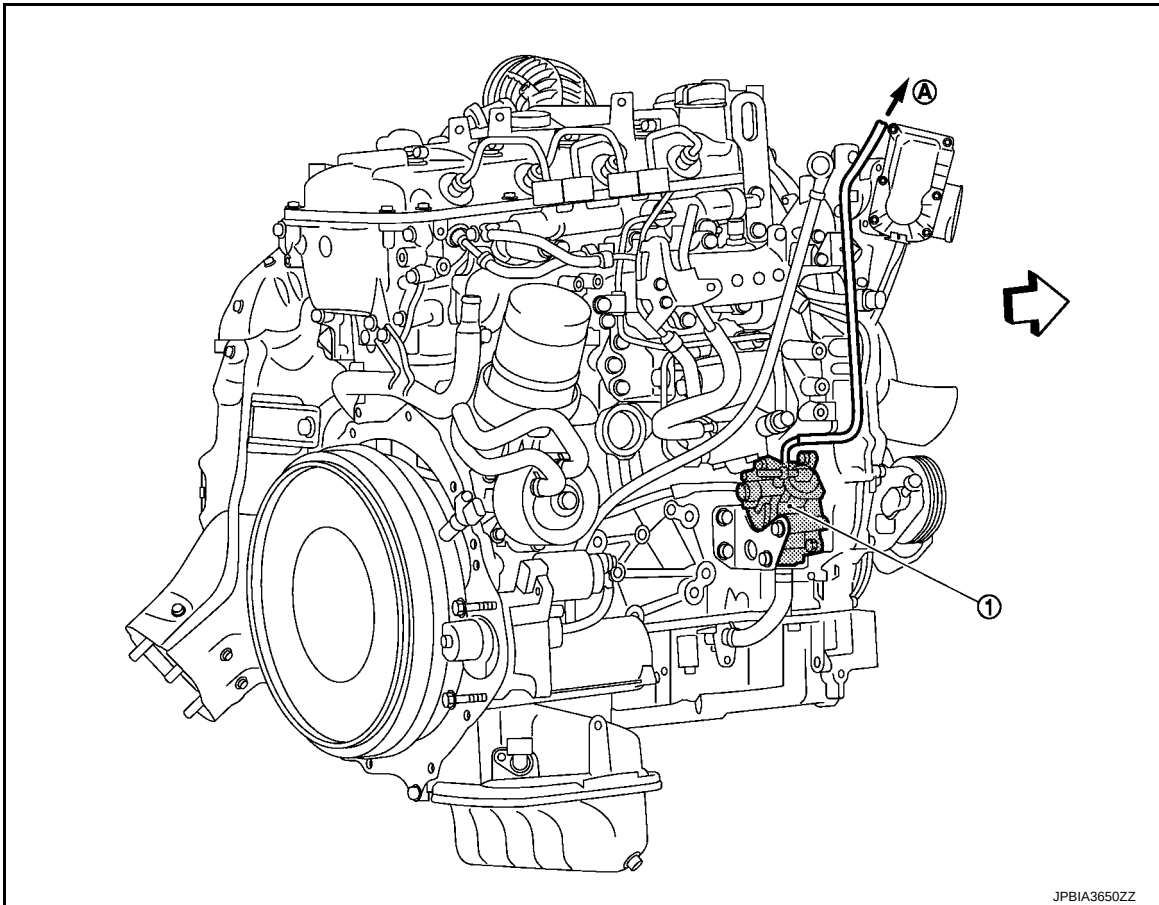
CAUTION:

Must be perform additional service when replacing ECM. Refer to [EC-1039, "Work Procedure"](#).

VACUUM LINES

Hydraulic Layout

INFOID:000000006107024



- 1. Vacuum pump
- A. To electronic controlled EGR cooler
bypass valve control solenoid valve

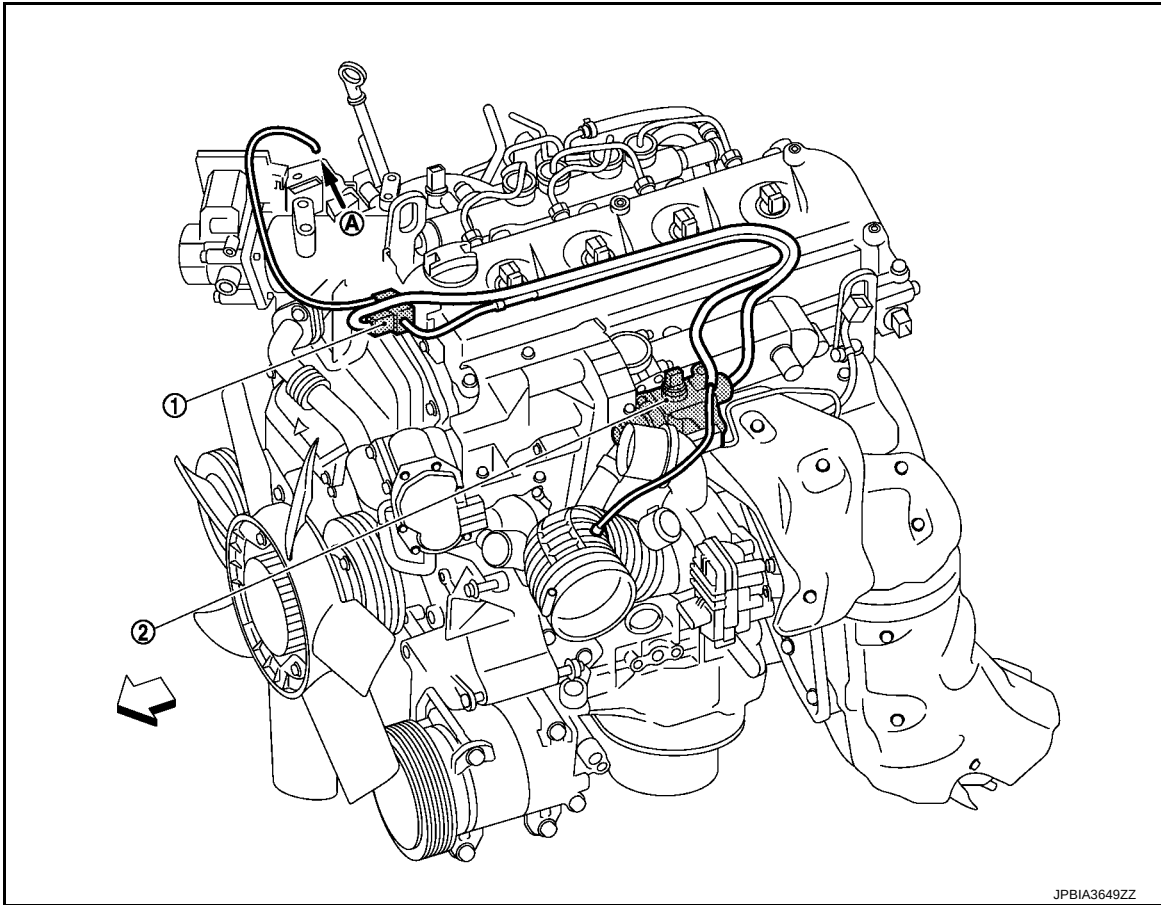
⇐ : Vehicle front

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

VACUUM LINES

< REMOVAL AND INSTALLATION >

[YD25DDTi]



1. EGR cooler bypass valve control solenoid valve 2. EGR cooler bypass valve

A. From vacuum pump

↙ : Vehicle front

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[YD25DDTi]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000006107025

Target idle speed	A/T	No load* (in P or N position)	750±25 rpm
	M/T	No load* (in Neutral position)	675±25 rpm
Air conditioner: ON	A/T	In P or N position	750 rpm or more
	M/T	In Neutral position	750 rpm or more
Maximum engine speed			4,500 rpm

*: Under the following conditions:

- Heat up switch: OFF
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

INFOID:0000000006107026

Supply voltage	Battery voltage (11 - 14 V)
Ignition switch ON (Engine stopped.)	Approx. 0.4 V
Idle (Engine is warmed up to normal operating temperature.)	0.8 - 1.3 V*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor 1

INFOID:0000000006107027

Temperature °C (°F)	Resistance kΩ
25 (77)	2.003 - 2.127
80 (176)	0.312 - 0.346

Engine Coolant Temperature Sensor

INFOID:0000000006107028

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Rail Pressure Sensor

INFOID:0000000006107029

Supply voltage	Approximately 5 V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0 V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3 V

Fuel Injector

INFOID:0000000006107030

Resistance [at 10 - 60°C (50 - 140°F)]	0.2 - 0.8 Ω

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[YD25DDTi]

Glow Plug

INFOID:0000000006107031

Resistance [at 25°C (77°F)]	Approximately 0.2 - 0.5 Ω

EGR Volume Control Valve

INFOID:0000000006107032

Resistance [at 25°C (77°F)]	13 - 17 Ω

Crankshaft Position Sensor

INFOID:0000000006107033

Refer to [EC-1098, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Camshaft Position Sensor

INFOID:0000000006107034

Refer to [EC-1100, "Component Inspection \(Camshaft Position Sensor\)"](#).

Fuel Pump

INFOID:0000000006107035

Resistance [at 10 - 60°C (50 - 140°F)]	1.5 - 3.0 Ω

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006466371

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

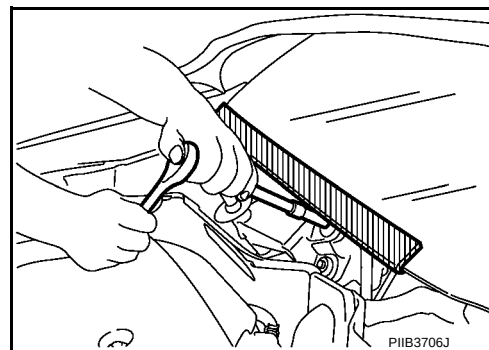
WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000006466372

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precaution for Battery Service (for V9X Models)

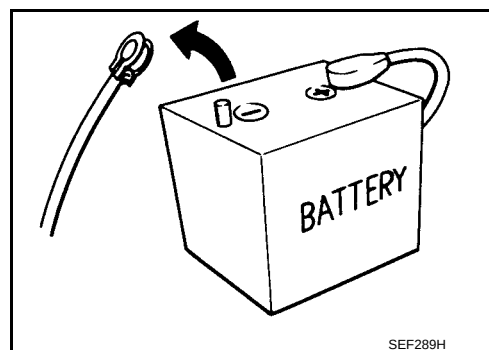
INFOID:000000006466374

When disconnect the battery cable, pay attention to the following.

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before disconnecting battery cables, turn ignition switch OFF and wait at least 4 minutes.
- After high-load driving, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery cable.

NOTE:

- Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
- Example of high-load driving
 - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
 - Driving for 30 minutes or more on a steep slope.



PRECAUTIONS

< PRECAUTION >

[V9X]

On Board Diagnostic (OBD) System of Engine

INFOID:000000006466375

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

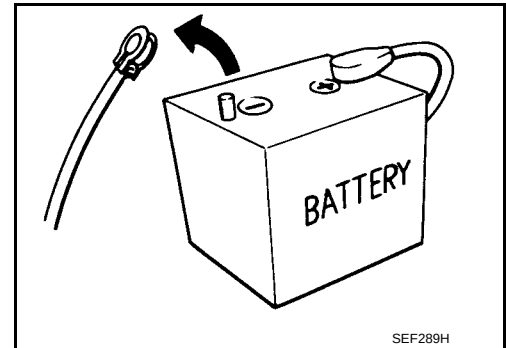
CAUTION:

- Always to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.
- Always to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-82, "Description"](#).
- Always to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.
- Always to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.
- Always to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

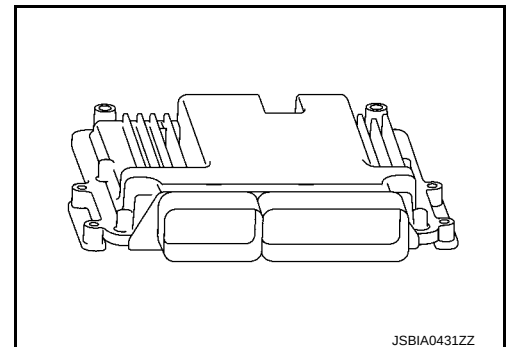
General Precautions

INFOID:000000006466376

- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF, wait 4 minutes and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.

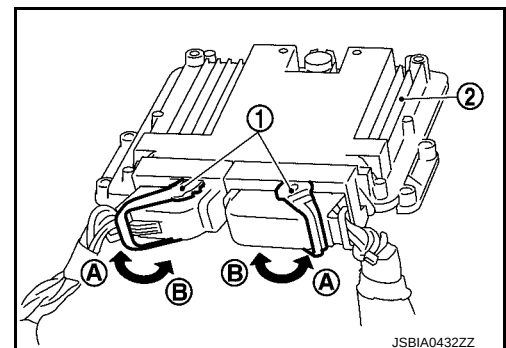


- Do not disassemble ECM.



- When connecting ECM harness connector (1), fasten (A) it securely with levers as far as they will go as shown in the figure.

- 2. ECM
- B. Loosen

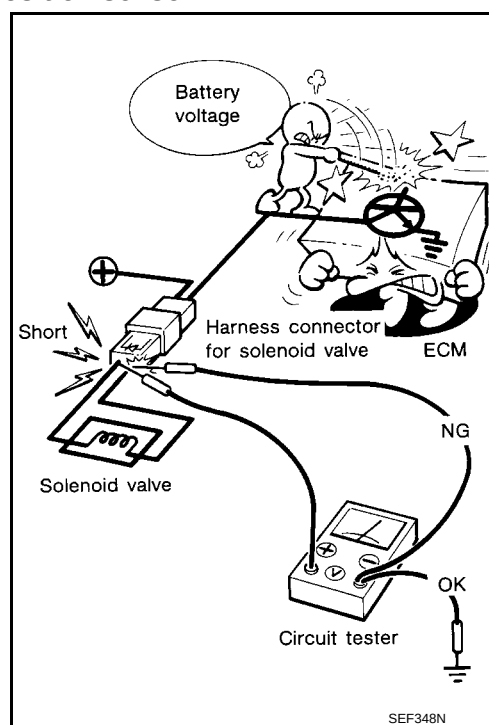
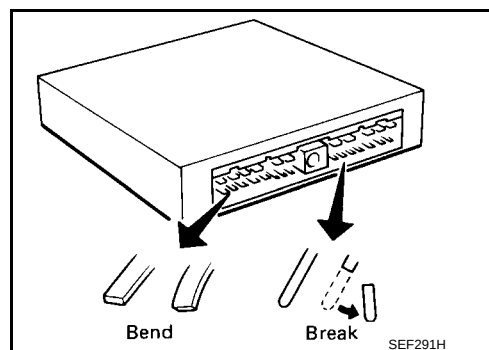


PRECAUTIONS

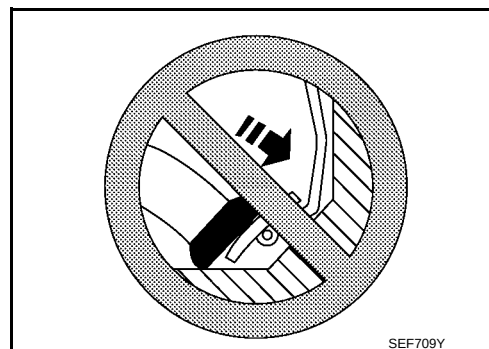
< PRECAUTION >

[V9X]

- When connecting or disconnecting pin connectors into or from ECM, never to damage pin terminals (bends or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.
- Keep engine control system parts and harness dry.
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor, crankshaft position sensor.
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.
- Do not disassemble fuel pump.
If NG, take proper action.
- Do not disassemble fuel injector.
If NG, replace fuel injector. Refer to [EM-316, "Removal and Installation"](#).



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

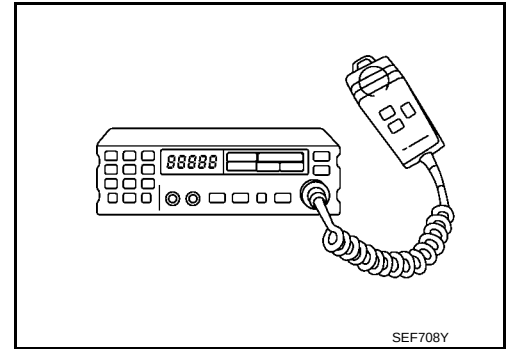


PRECAUTIONS

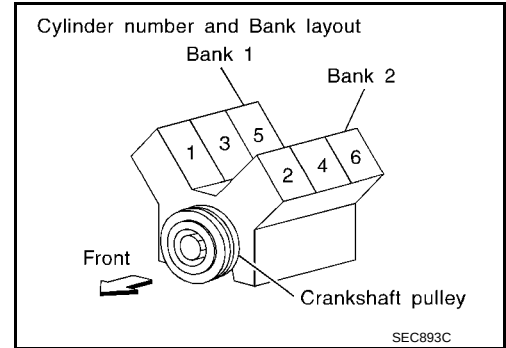
< PRECAUTION >

[V9X]

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standingwave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.



ENGINE RUNNING

- No work should be carried out on the hydraulic system while engine is running.
- Remember that fuel pressure values in hydraulic circuit can reach up to 180 MPa (1800 bar, 1836 kg/cm², 26100 psi).
- Keep hands or face (particularly eyes) out of any high pressure leak.
- Recall that fuel is dangerous for health.

FUEL RAIL PRESSURE SENSOR

- Under warranty, do not remove the fuel rail pressure sensor from the rail.
- Do not try to measure the resistance of the fuel rail pressure sensor. This test is destructive for the internal components.

FUEL INJECTOR

- Fuel injectors are driven by over 100 V.
- Fuel injector electronics are polarised. In case of intervention on wiring harness, do not invert wires. It is destructive for the piezo components.
- Do not drive the fuel injectors if their body is not connected to the battery ground (risk of electrostatic discharge). For instance, fuel injector body have to be in contact with cylinder.
- Piezo fuel injector connector must not be unplugged while engine is running. Risk of major damage to the engine (fuel injector could stay opened).

Cleanliness

INFOID:000000006466377

Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated with contamination are:

- damage to or destruction of the high pressure injection system,
- components jamming,
- components losing seal integrity.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) should have entered the system during dismantling.

The cleanliness principle must be applied from the filter to the fuel injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,

PRECAUTIONS

[V9X]

< PRECAUTION >

- fibers,
 - from cardboard,
 - from brushes,
 - from paper,
 - from clothing,
 - from cloths,
- foreign bodies such as hair,
- ambient air,
- etc.

NOTE:

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunction.

INSTRUCTIONS TO BE FOLLOWED BEFORE CARRYING OUT ANY WORK

NOTE:

Before any work is carried out on the high pressure injection system, protect:

- the accessories and timing belts,
- the electrical accessories, (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any diesel from running onto the clutch friction plate.

- Check that you have plugs for the unions to be opened (set of plugs available from the Parts Department). The plugs are single-use only. After use, they must be discarded (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be discarded.
- Check that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags are to be used once only, and discarded after use.
- Use lint-free cleaning cloths. Using normal cloth or paper is prohibited. They are not lint-free and could contaminate the fuel circuit. Each cloth should only be used once.
- Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into an uncontaminated container.
- For each operation, use a clean brush in good condition (the brush must not shed its bristles).
- Use a brush and cleaning agent to clean the unions to be opened.
- Blast compressed air over the cleaned parts (tools, workbench, the parts, unions and injection system zones). Check that no bristles remain.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves cover them with latex gloves to prevent contamination.

INSTRUCTIONS TO BE FOLLOWED WHEN CARRYING OUT ANY WORK

- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The plugs must not be reused under any circumstances.
- Seal the pouch shut, even if it has to be opened shortly afterwards. Ambient air carries contamination.
- All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been plugged.
- Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow contamination to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[V9X]

SYSTEM DESCRIPTION

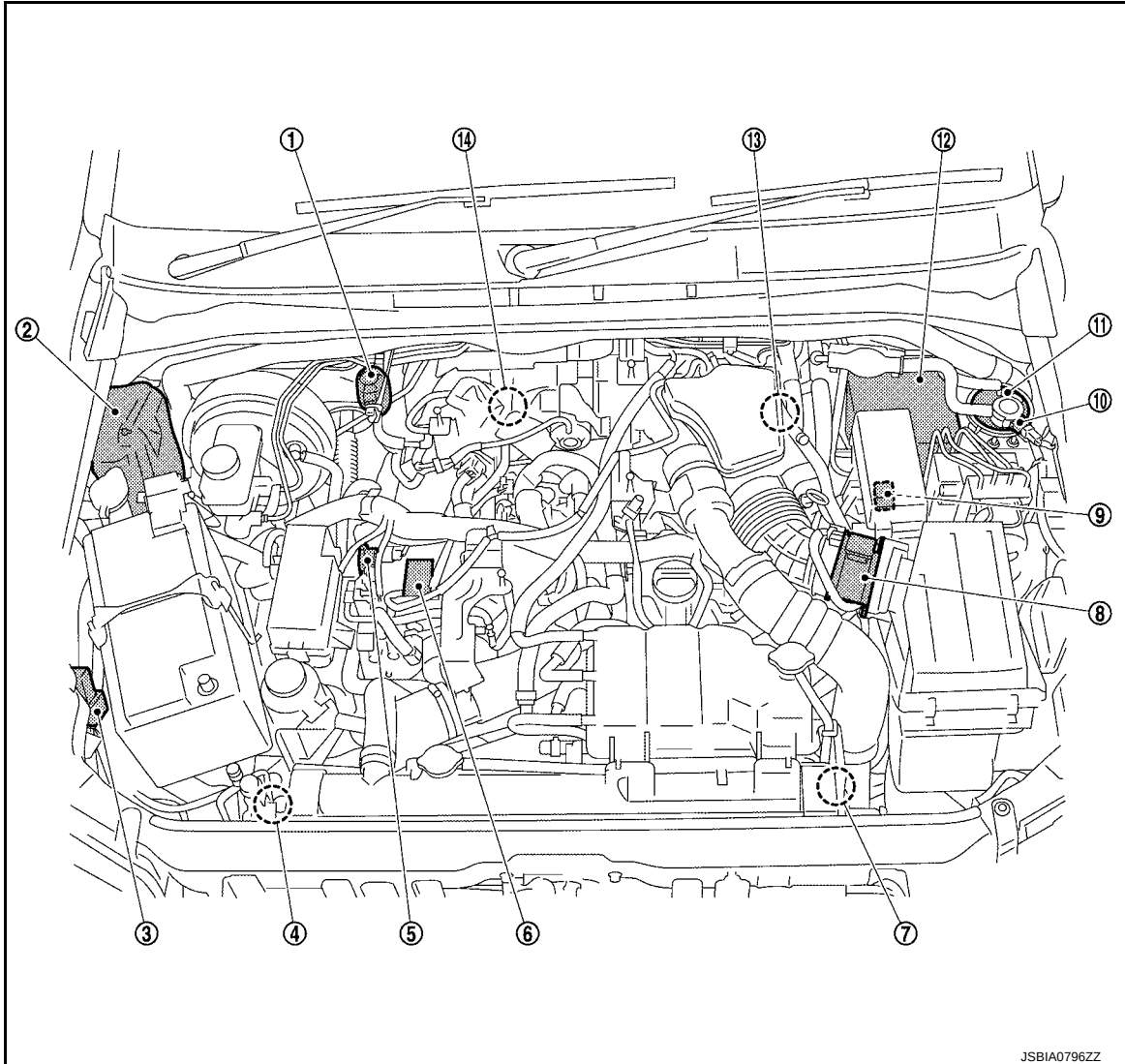
COMPONENT PARTS

Component Parts Location

INFOID:000000006466378

ENGINE ROOM COMPARTMENT

Top View



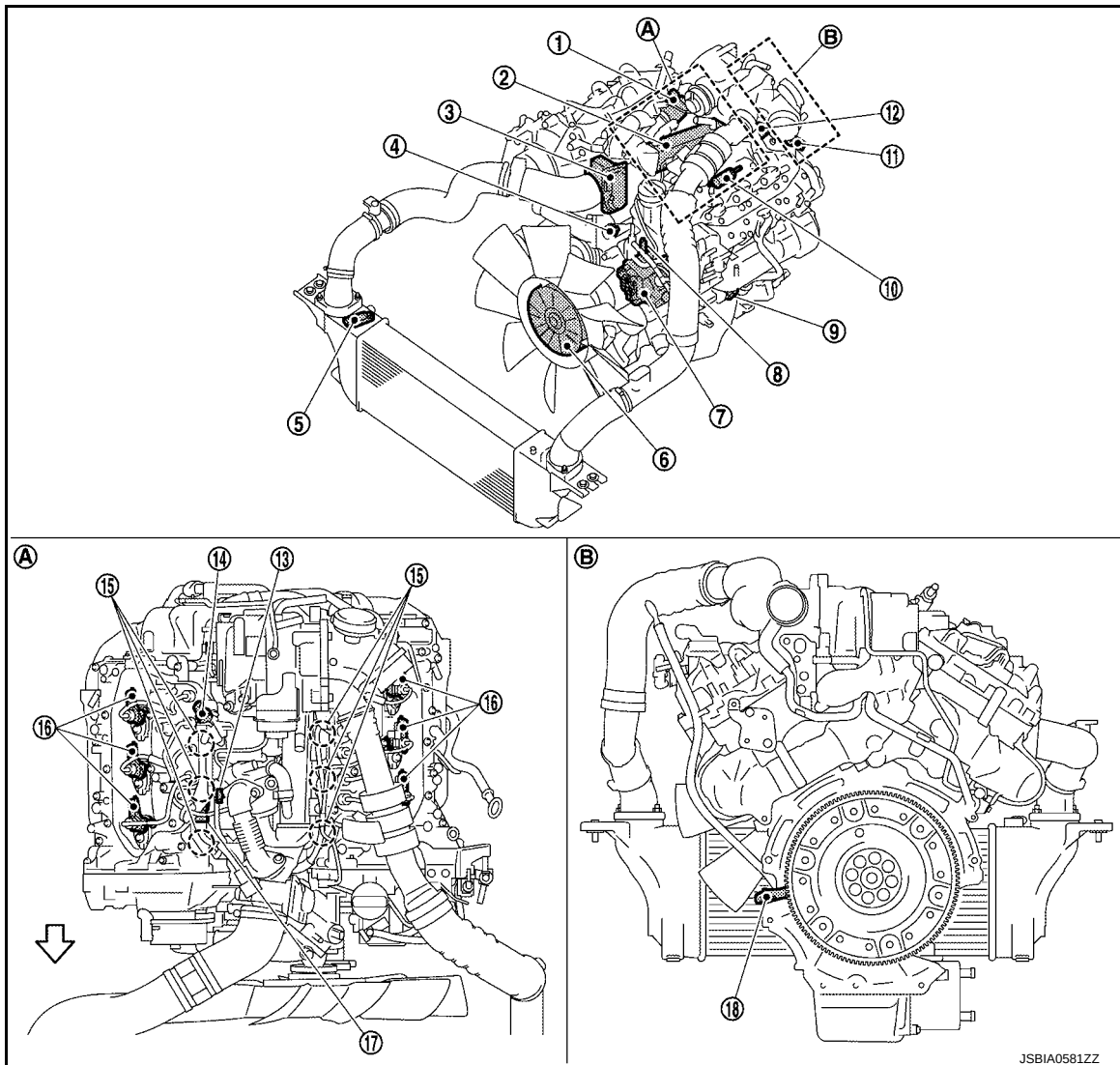
1. Turbocharger boost control solenoid valve	2. ECM	3. Glow control unit
4. Refrigerant pressure sensor	5. Electronic controlled engine mount control solenoid valve	6. EGR cooler bypass valve control solenoid valve
7. EGR cooling water pump	8. Mass air flow sensor (with intake air temperature sensor)	9. ECM relay
10. Fuel filter sensor	11. Fuel filter	12. IPDM E/R
13. Turbocharger cooling water pump	14. A/F sensor	

ENGINE COMPARTMENT

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[V9X]



1. EGR volume control valve	2. EGR cooler	3. Electric throttle control actuator
4. Engine coolant temperature sensor	5. Turbocharger boost sensor	6. Electrically-controlled cooling fan coupling
7. High pressure fuel pump	8. Fuel temperature	9. Engine oil temperature/level sensor
10. Fuel pressure holding valve	11. Camshaft position sensor	12. Fuel rail pressure regulation actuator
13. Exhaust gas temperature sensor 1	14. Exhaust gas pressure sensor 1	15. Glow plug
16. Fuel injector	17. Fuel rail pressure sensor	18. Crankshaft position sensor
A. Top view of the engine (View with intake manifold is removed)	B. Rear view of the engine	

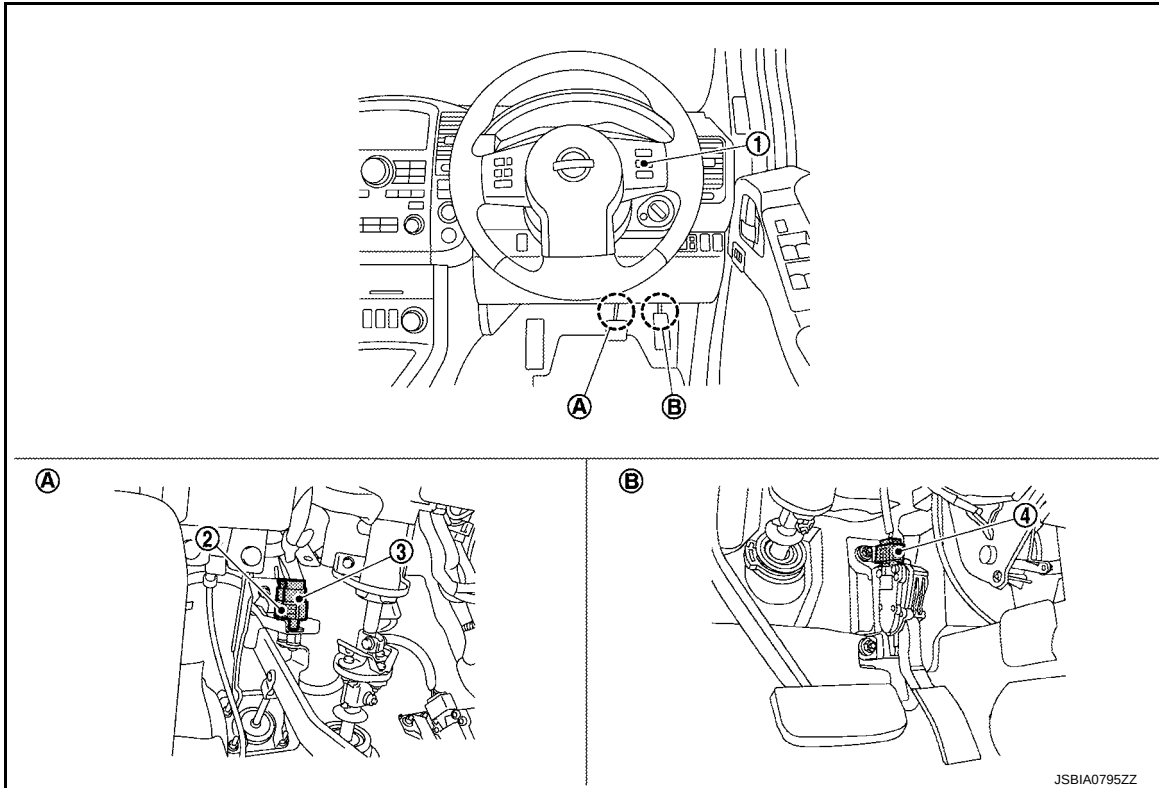
↶: Vehicle front

BODY COMPARTMENT

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[V9X]



1. ASCD steering switch
2. Stop lamp switch
3. ASCD brake switch
4. Accelerator pedal position sensor
- A. Around the brake pedal
- B. Around the accelerator pedal

Component Description

INFOID:000000006466379

Component	Reference
ECM	EC-1231, "ECM"
Camshaft position sensor	EC-1231, "Camshaft Position Sensor"
Crankshaft position sensor	EC-1232, "Crankshaft Position Sensor"
Mass air flow sensor	EC-1232, "Mass Air Flow Sensor"
A/F sensor	EC-1232, "Air Fuel Ratio (A/F) Sensor"
Intake air temperature sensor	EC-1232, "Intake Air Temperature Sensor"
Barometric pressure sensor	EC-1232, "Barometric Pressure sensor"
Engine coolant temperature sensor	EC-1233, "Engine Coolant Temperature Sensor"
Fuel injector	EC-1233, "Fuel Injector"
High pressure fuel pump	EC-1234, "High Pressure Fuel Pump"
Fuel rail pressure regulation actuator	EC-1234, "Fuel Rail Pressure Regulation Actuator"
Fuel pressure holding valve	EC-1234, "Fuel Pressure Holding Valve"
Fuel rail pressure sensor	EC-1234, "Fuel Rail Pressure Sensor"
Fuel temperature sensor	EC-1234, "Fuel Temperature Sensor"
Turbocharger boost sensor	EC-1234, "Turbocharger Boost Sensor"
Turbocharger boost control solenoid valve	EC-1234, "Turbocharger Boost Control Solenoid Valve"
Turbocharger cooling water pump	EC-1234, "Turbocharger Cooling Water Pump"
EGR volume control valve	EC-1234, "EGR Volume Control Valve"

COMPONENT PARTS

< SYSTEM DESCRIPTION >

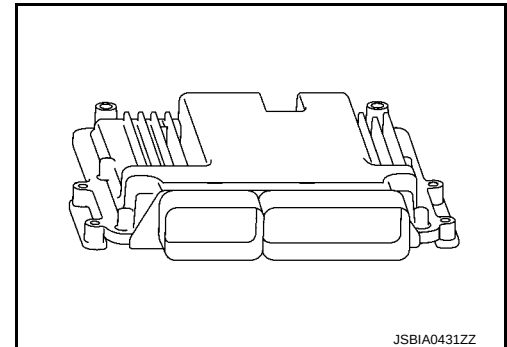
[V9X]

Component	Reference
EGR cooling water pump	EC-1235, "EGR Cooling Water Pump"
EGR cooler bypass valve	EC-1235, "EGR Cooler Bypass Valve"
EGR cooler bypass valve control solenoid valve	EC-1235, "EGR Cooler Bypass Valve Control Solenoid Valve"
Exhaust gas pressure sensor 1	EC-1235, "Exhaust Gas Pressure Sensor 1"
Exhaust gas temperature sensor 1	EC-1235, "Exhaust Gas Temperature Sensor 1"
Accelerator pedal position sensor	EC-1236, "Accelerator Pedal Position Sensor"
Electric throttle control actuator	EC-1236, "Electric Throttle Control Actuator"
Glow control unit	EC-1236, "Glow Control Unit"
Glow plug	EC-1236, "Glow Plug"
Glow indicator lamp	EC-1236, "Glow Indicator Lamp"
Fuel heater	EC-1236, "Fuel Heater"
Electronic controlled engine mount control solenoid valve	EC-1236, "Electronic Controlled Engine Mount Control Solenoid Valve"
Fuel filter sensor	EC-1236, "Fuel Filter Sensor"
Refrigerant pressure sensor	EC-1236, "Refrigerant Pressure Sensor"
Engine oil temperature/level sensor	EC-1237, "Engine Oil Temperature/Level Sensor"
ASCD brake switch	EC-1237, "ASCD Brake Switch"
Stop lamp switch	EC-1237, "Stop Lamp Switch"
ASCD steering switch	EC-1237, "ASCD Steering Switch"
Malfunction indicator	EC-1237, "Malfunction Indicator"
Information display	EC-1237, "Information Display"
Electrically-controlled cooling fan coupling	EC-1232, "Electrically-controlled cooling fan coupling"

ECM

INFOID:000000006466380

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

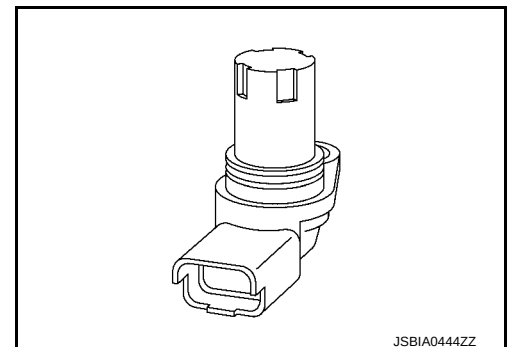


Camshaft Position Sensor

INFOID:000000006466381

Camshaft position (CMP) sensor transmits piston position signal to ECM. This sensor consists of a permanent magnet and Hall IC, and is installed near signal plate at back end of intake side cam sprocket in bank 2.

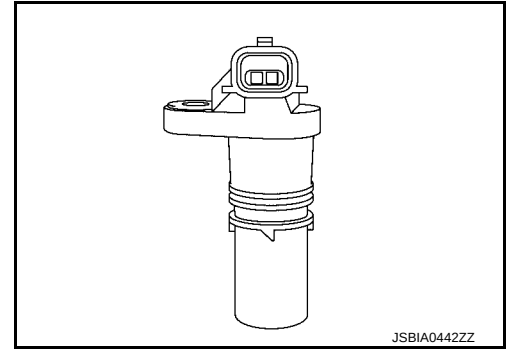
Signal plate has standard gear tooth and signal gear tooth. While engine running, the size difference of gear tooth changes the gap between signal plate and sensor, and magnetic field change around the sensor induces sensor output voltage change. ECM judges the cylinder based on this voltage change and signal input timing. furthermore, when a malfunction occurs in the crankshaft position sensor, ECM allows the engine to run, according to a piston position signal transmitted from the camshaft position sensor.



Crankshaft Position Sensor

INFOID:000000006466382

Crankshaft position (CKP) sensor detects engine speed and crankshaft position. The size difference of gear tooth placed on signal plate changes the gap between signal plate and sensor, and magnetic field change around the sensor induces sensor output voltage change. ECM detects engine speed and crankshaft position based on this voltage change. Since signal plate has gear teeth with space of 6 degrees, standard location can be detected by setting a part without tooth.



JSBIA0442ZZ

Mass Air Flow Sensor

INFOID:000000006466383

The mass air flow sensor is installed in the stream of intake air and measures the intake flow rate by measuring apart of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

Air Fuel Ratio (A/F) Sensor

INFOID:000000006466384

Air fuel ratio (A/F) sensor is installed on the upstream of the oxidation catalyst. A/F sensor measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor sends the signal to ECM. Based on the signal from A/F sensor, ECM calculates the air fuel mixture ratio.

A heater is integrated in A/F sensor to ensure the required operating temperature.

Intake Air Temperature Sensor

INFOID:000000006466385

The intake air temperature (IAT) sensor is built into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.

Barometric Pressure sensor

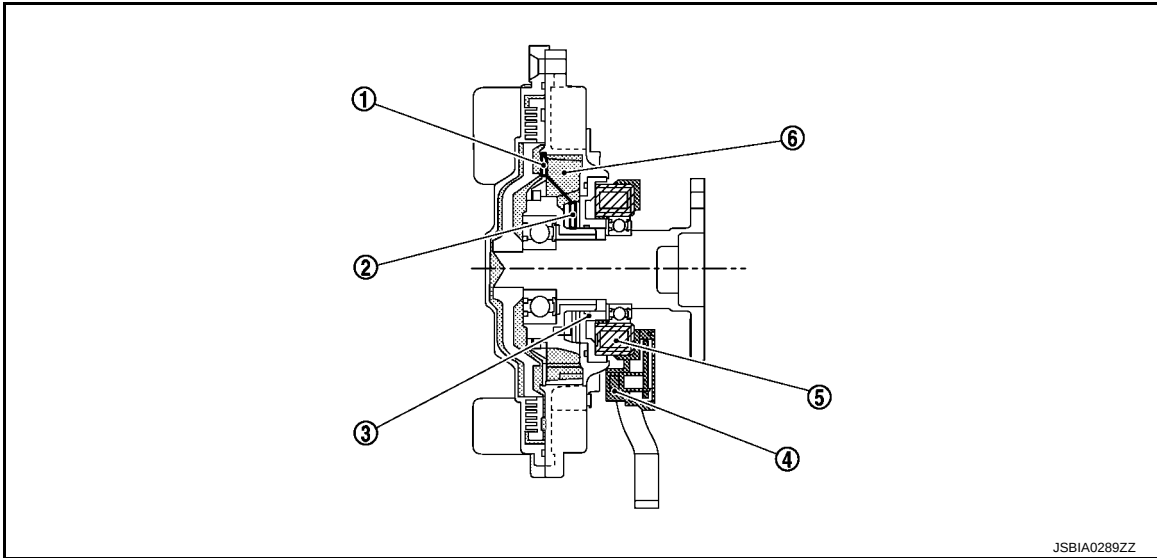
INFOID:000000006466386

The barometric (BARO) pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

Electrically-controlled cooling fan coupling

INFOID:000000006466387

Electrically-controlled cooling fan coupling is integrated with a fan coupling, fan coupling driver, and fan speed sensor, mounted to the fan pulley, and actuated by the drive belt to rotate the cooling fan at a speed suitable for a driving condition.

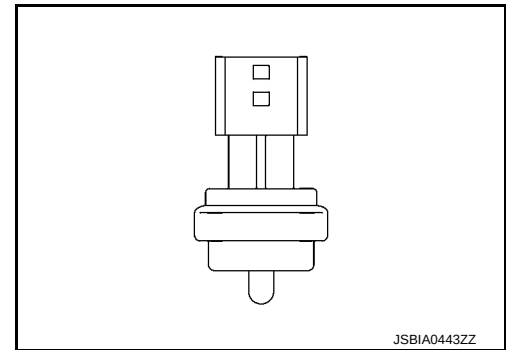


1. Valve	2. Armature	3. Magnet Loop Element
4. Fan speed sensor	5. Coil	6. Silicon oil

Engine Coolant Temperature Sensor

INFOID:000000006466388

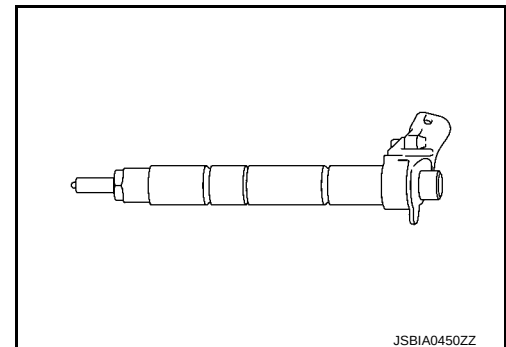
The engine coolant temperature (ECT) sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



Fuel Injector

INFOID:000000006466389

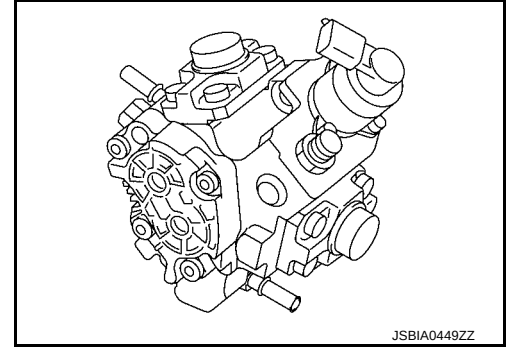
Fuel injector actuator is using piezo element that is expanded or compressed when electric voltage is applied. Needle valve is immediately opened or closed and fuel is atomized by increasing fuel pressure at fuel injection nozzle.



High Pressure Fuel Pump

INFOID:000000006466390

High pressure fuel pump is installed at bank 2 side of front cover. The pump is operated by high pressure fuel pump drive pinion, installed at front part of exhaust side camshaft. High pressure fuel pump inlets fuel transported through fuel filter and performs pressure feed to fuel rail. The pump includes fuel flow actuator which enables adjustment of fuel rail pressure.



Fuel Rail Pressure Regulation Actuator

INFOID:000000006466391

Fuel rail pressure regulation actuator is installed at fuel rail in bank 2. ECM activates the fuel rail pressure regulation actuator and escapes fuel to return side.

Fuel Pressure Holding Valve

INFOID:000000006466392

The fuel pressure holding valve is mounted to the fuel injector return piping and the valve maintains the internal fuel pressure of the fuel injector at approximately 1 MPa (10.2 kg/cm², 10 bar, 145 psi).

Fuel Rail Pressure Sensor

INFOID:000000006466393

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. ECM activates fuel flow actuator and fuel rail pressure regulation actuator according to feedback signal from fuel rail pressure sensor, and controls fuel pressure inside fuel rail.

Fuel Temperature Sensor

INFOID:000000006466394

Fuel temperature sensor measures fuel temperature inside fuel tube of engine room. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

Turbocharger Boost Sensor

INFOID:000000006466395

The turbocharger boost sensor detects pressure in the charge air cooler outlet area. The sensor send to voltage signal to the ECM. As the pressure increases, the voltage rises.

Turbocharger Boost Control Solenoid Valve

INFOID:000000006466396

Turbocharger boost control solenoid valve controls the turbocharger boost control actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted. The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

Turbocharger Cooling Water Pump

INFOID:000000006466397

Turbocharger cooling water pump is an electric pump. After engine stop, ECM operates turbocharger cooling water pump for a duration according to engine cooling water temperature to circulate engine cooling water around turbine bearing in order to prevent turbine bearing breakage.

EGR Volume Control Valve

INFOID:000000006466398

The EGR volume control valve position sensor consists of a permanent magnet and Hall IC, and senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[V9X]

EGR Cooling Water Pump

INFOID:000000006466399

EGR cooling water pump is an electric pump which circulates cooling water in EGR cooler. The pump operates permanently when engine is running.

EGR Cooler Bypass Valve

INFOID:000000006466400

EGR cooler bypass valve closes EGR cooler bypass when engine is started. The gas is provided without penetrating EGR cooler to raise combustion temperature efficiently.
ECM controls EGR cooler bypass valve control solenoid valve. It gives negative pressure to diaphragm part of EGR cooler bypass valve, and opens flap using rod.

EGR Cooler Bypass Valve Control Solenoid Valve

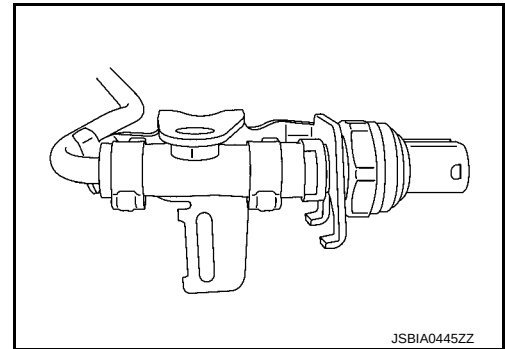
INFOID:000000006466401

EGR cooler bypass valve control solenoid valve is controlled by ECM. The solenoid valve controls negative pressure given to diaphragm of EGR cooler bypass valve. When EGR cooler bypass valve control solenoid valve is activated, it opens solenoid valve and gives negative pressure from vacuum pump to diaphragm of EGR cooler bypass valve.

Exhaust Gas Pressure Sensor 1

INFOID:000000006466402

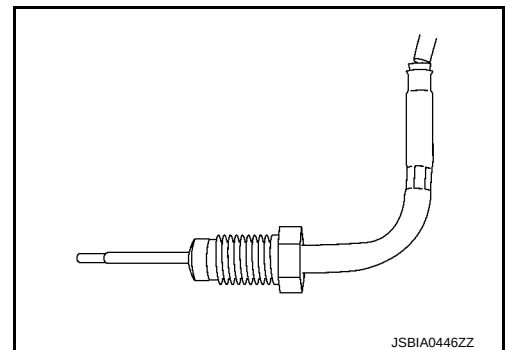
Exhaust gas pressure sensor 1 is connected to turbocharger via exhaust pressure tube. The sensor measures exhaust gas pressure around turbocharger outlet, converts it to voltage signal and transmits it to ECM. ECM controls turbocharger boost pressure according to this signal.



Exhaust Gas Temperature Sensor 1

INFOID:000000006466403

The exhaust gas temperature (EGT) sensor 1 detects the exhaust gas temperature before turbocharger. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the exhaust gas temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



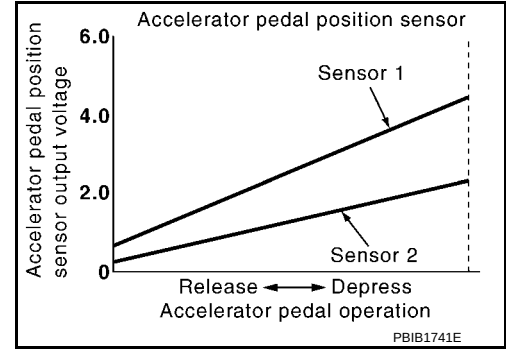
<Reference data>

Exhaust gas temperature °C (°F)	Resistance (Approx.) kΩ
300 (572)	5.33 – 6.61
600 (1112)	0.352 – 0.373
900 (1652)	0.0861 – 0.0927

Accelerator Pedal Position Sensor

INFOID:000000006466404

The accelerator pedal position (APP) sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



Electric Throttle Control Actuator

INFOID:000000006466405

Throttle control motor is operated by ECM and it opens throttle valve. Throttle valve is fully opened when regeneration is not performed and engine is running. Based on the signal from throttle position sensor, ECM judges whether throttle control actuator operates throttle valve properly or not.

Glow Control Unit

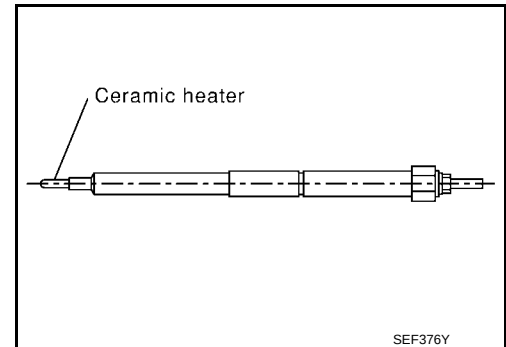
INFOID:000000006466406

Glow Control Unit performs PWM (Pulse Width Modulation) communication with ECM. It improves engine starting function by performing glow control.

Glow Plug

INFOID:000000006466407

The glow plug is located in the cylinder head, in order to stabilize combustion and keep good cold start performance. The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. The glow plug glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow control unit.



Glow Indicator Lamp

INFOID:000000006466408

Glow indicator lamp illuminates when glow system is activated in order to inform it to the driver.

Fuel Heater

INFOID:000000006466409

Fuel heater is installed on fuel filter and operated when fuel temperature is low in order to inhibit fuel solidification caused by wax content separation in fuel.

Electronic Controlled Engine Mount Control Solenoid Valve

INFOID:000000006466410

Electronic controlled engine mount control solenoid valve is turned ON/OFF by ECM. The solenoid valve controls engine mount by switching the flow of negative pressure caused by vacuum pump.

Fuel Filter Sensor

INFOID:000000006466411

Fuel filter sensor is installed on fuel filter and illuminates water level warning lamp when water accumulates inside the filter.

Refrigerant Pressure Sensor

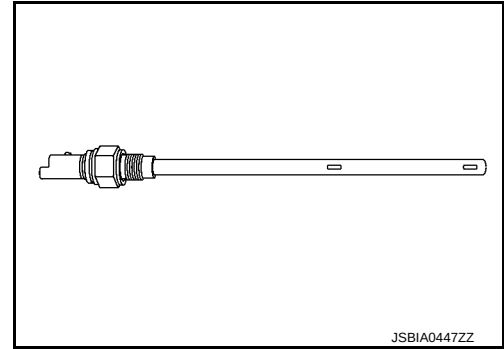
INFOID:000000006466412

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM.

Engine Oil Temperature/Level Sensor

INFOID:000000006466413

The engine oil temperature (EOT) sensor is integral with the engine oil level sensor and used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



ASCD Brake Switch

INFOID:000000006466414

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to [EC-1256. "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for the ASCD function.

Stop Lamp Switch

INFOID:000000006466415

Stop lamp switch signal is sent to ECM via CAN communication line from BCM. This signal is used mainly to decrease the engine speed when the vehicle is driving.

ASCD Steering Switch

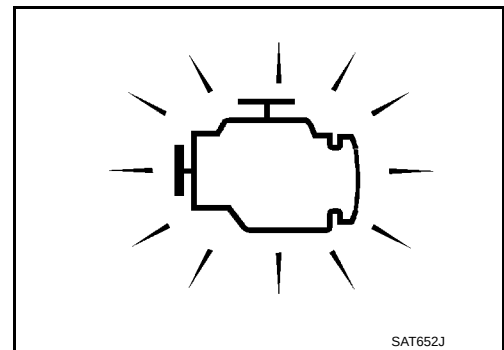
INFOID:000000006466416

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Malfunction Indicator

INFOID:000000006466417

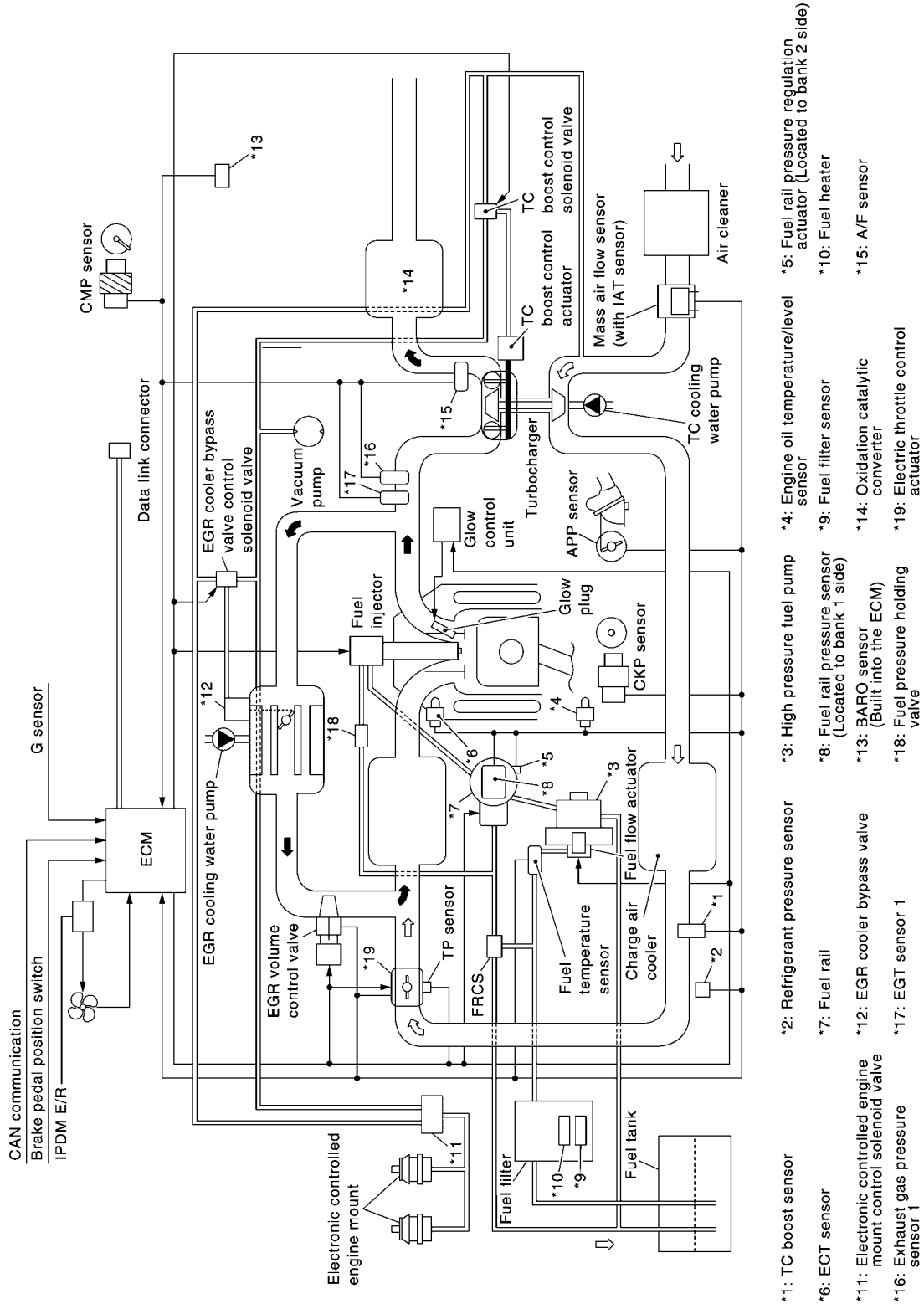
The malfunction indicator (MI) is located on the combination meter. The MI will illuminate when the ignition switch is turned ON without the engine running (bulb check). When the engine is started, the MI should turn OFF. If the MI remains illuminated, the on board diagnostic system has detected an engine system malfunction.



Information Display

INFOID:000000006466418

The operation mode of the ASCD and speed limiter are indicated on the information display in the combination meter. ECM transmits the status signal to the combination meter via CAN communication according to ASCD and speed limiter operation.

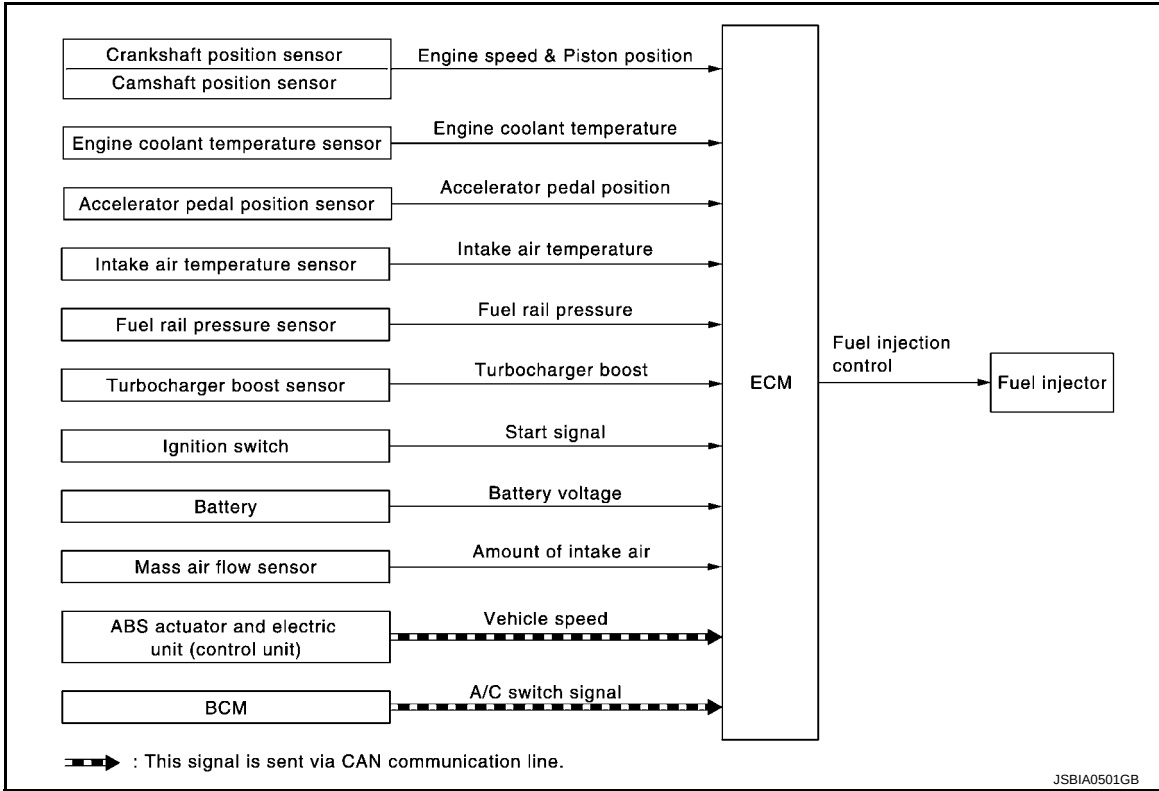


FUEL INJECTION CONTROL SYSTEM : System Description

INFOID:000000006466420

FUEL INJECTION CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control	Fuel injector
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature sensor	Intake air temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		
Ignition switch	Start signal		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
ABS actuator and electric unit (control unit)	Vehicle speed*		
BCM	A/C switch signal*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION

ECM determines the appropriate fuel injection control and adjusts the amount of fuel injected to improve engine performance. Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

Fuel injection is consisted by pilot injection, main injection and post injection. This system injects fuel at three to five times per cycle according to the driving condition.

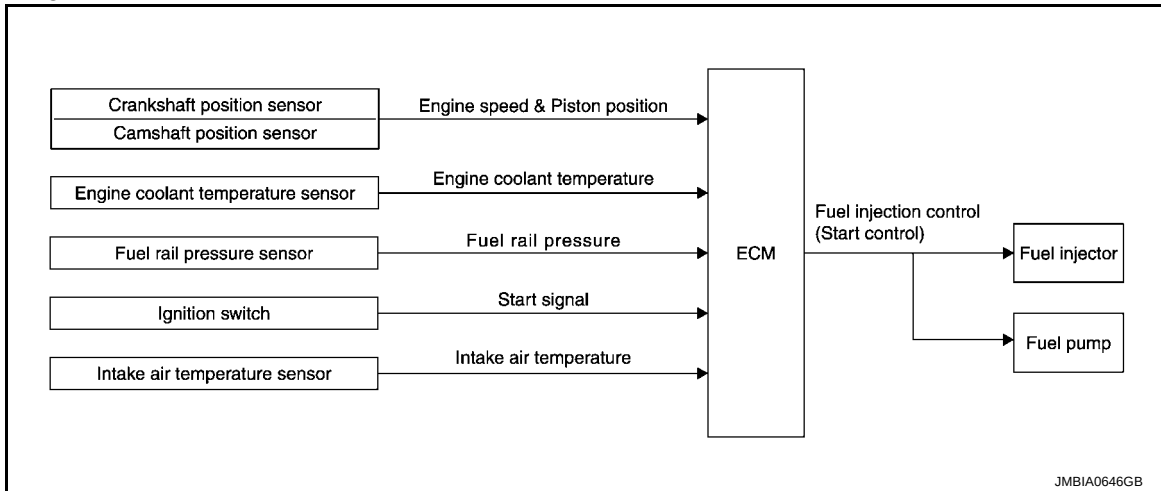
START CONTROL

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

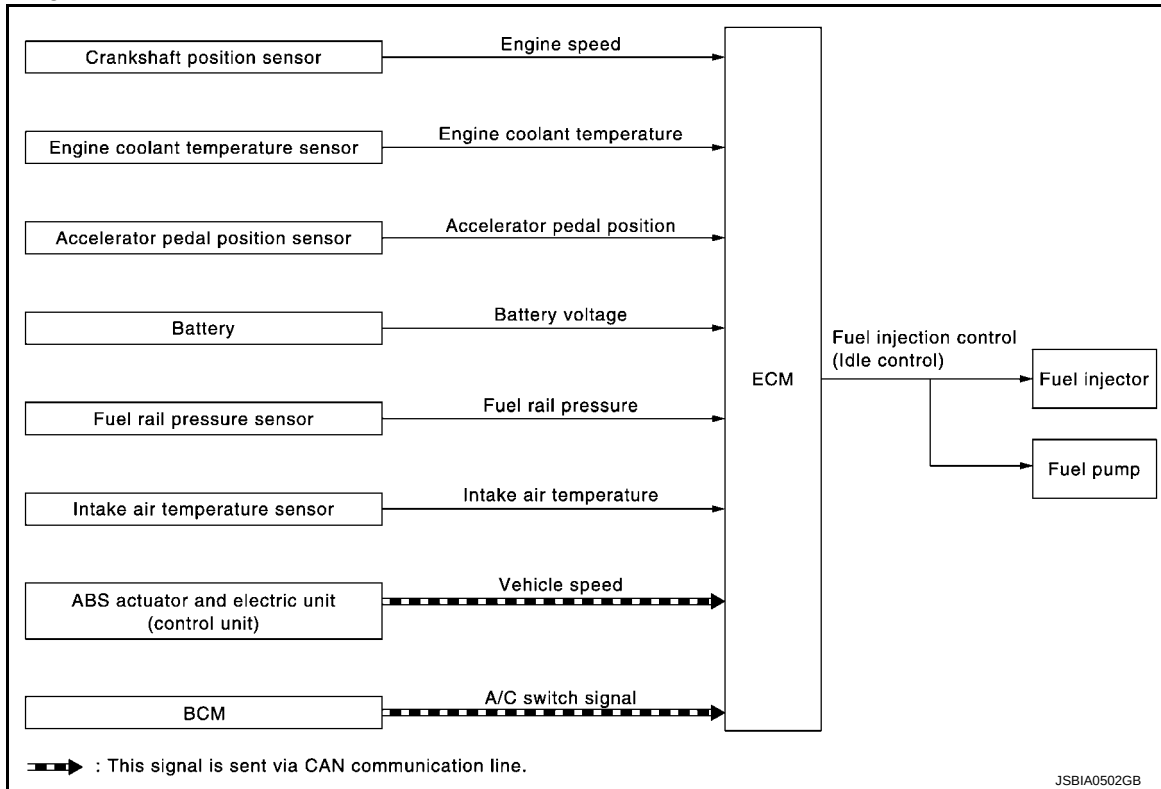
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Start control)	Fuel injector Fuel pump
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Ignition switch	Start signal		
Intake air temperature sensor	Intake air temperature		

SYSTEM DESCRIPTION

When ECM detected the engine revolution pulse at engine cranking, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature, intake air temperature and fuel rail pressure. For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.

IDLE CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Idle control)	Fuel injector Fuel pump
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage		
Fuel rail pressure sensor	Fuel rail pressure		
Intake air temperature sensor	Intake air temperature		
ABS actuator and electric unit (control unit)	Vehicle speed*		
BCM	A/C switch signal*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

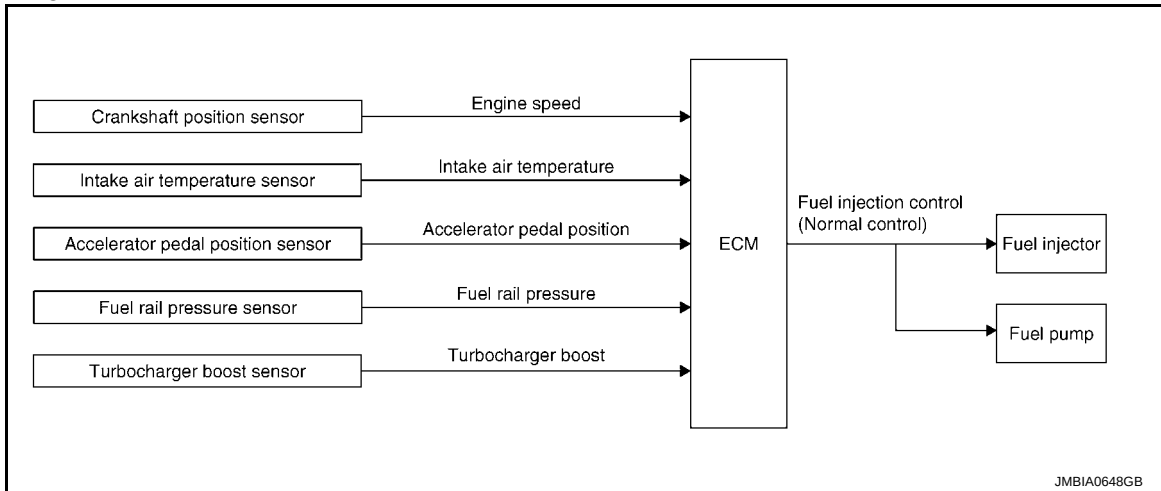
NORMAL CONTROL

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

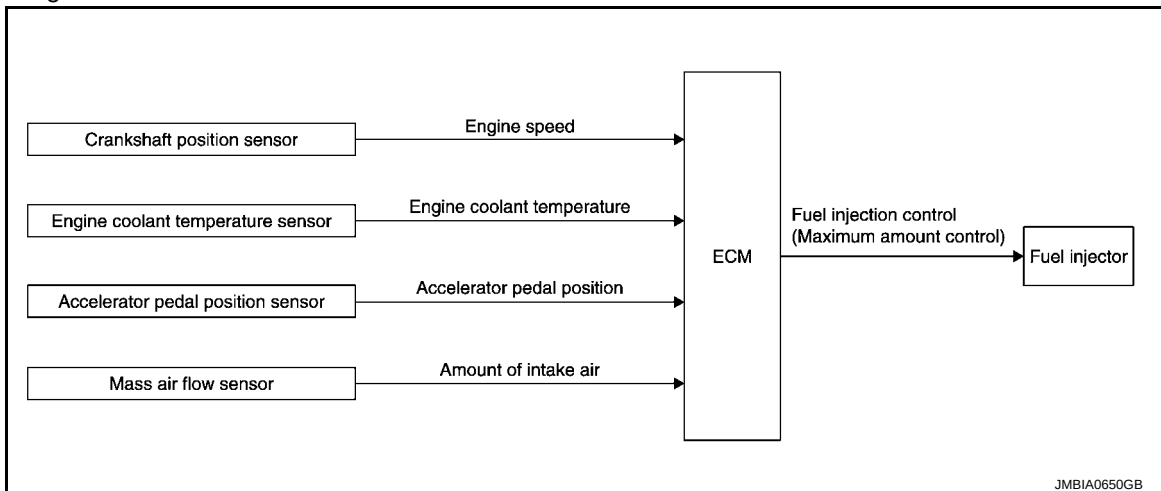
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Intake air temperature sensor	Intake air temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		

SYSTEM DESCRIPTION

The amount of fuel injected under normal driving conditions is determined according to sensor signals. These sensors send signals to the ECM. The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal position and fuel rail pressure are stored in the ECM memory, forming a map. The ECM detains the optimal amount of fuel to be injected using the sensor signals in comparison with the map.

MAXIMUM AMOUNT CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

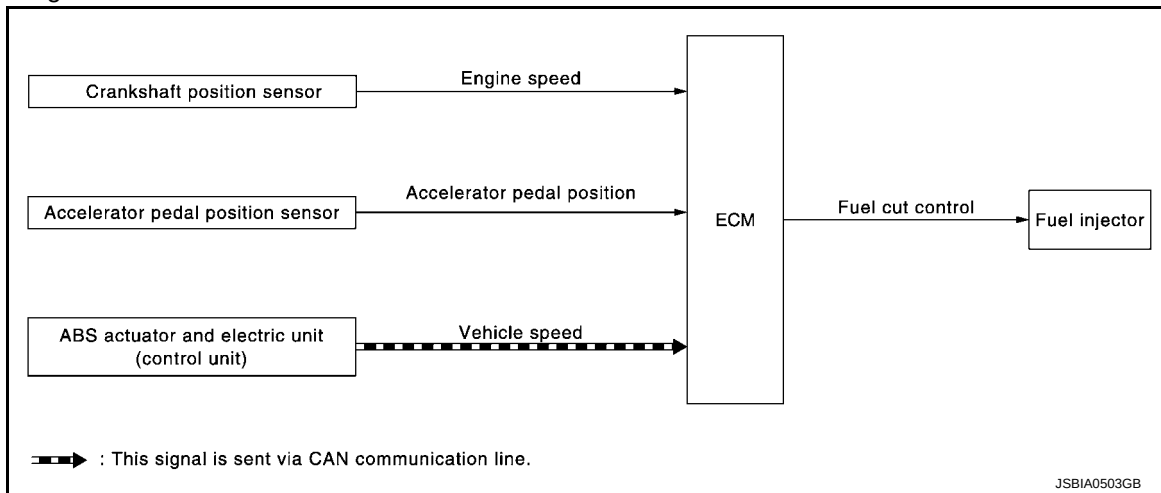
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Maximum control)	Fuel injector
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		

SYSTEM DESCRIPTION

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature and accelerator opening in accelerator with the driving conditions. This prevents the over-supply of the injection amount caused by decreased air density at a high altitude or during a system failure.

FUEL CUT CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Fuel cut control)	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
ABS actuator and electric unit (control unit)	Vehicle speed*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor, crankshaft position sensor and vehicle speed sensor.

FUEL INJECTION TIMING CONTROL SYSTEM

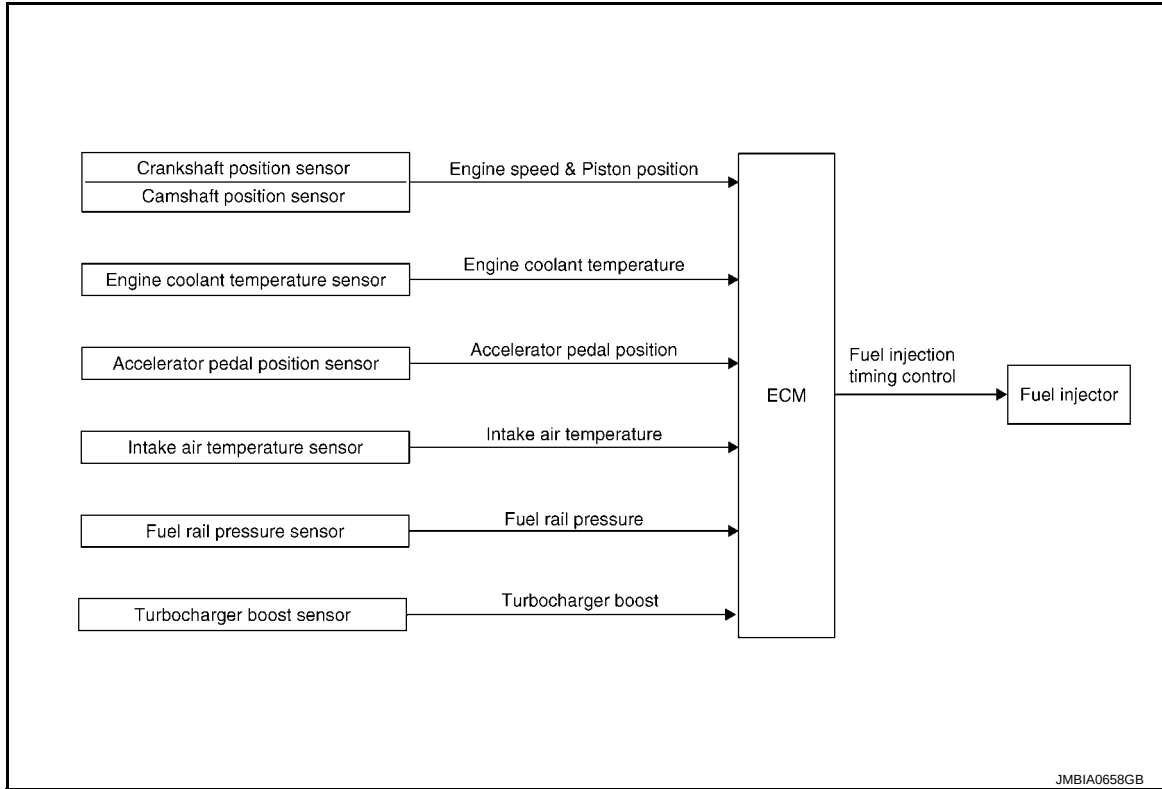
SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

FUEL INJECTION TIMING CONTROL SYSTEM : System Diagram

INFOID:000000006466421



FUEL INJECTION TIMING CONTROL SYSTEM : System Description

INFOID:000000006466422

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection timing control	Fuel injector
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature sensor	Intake air temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		

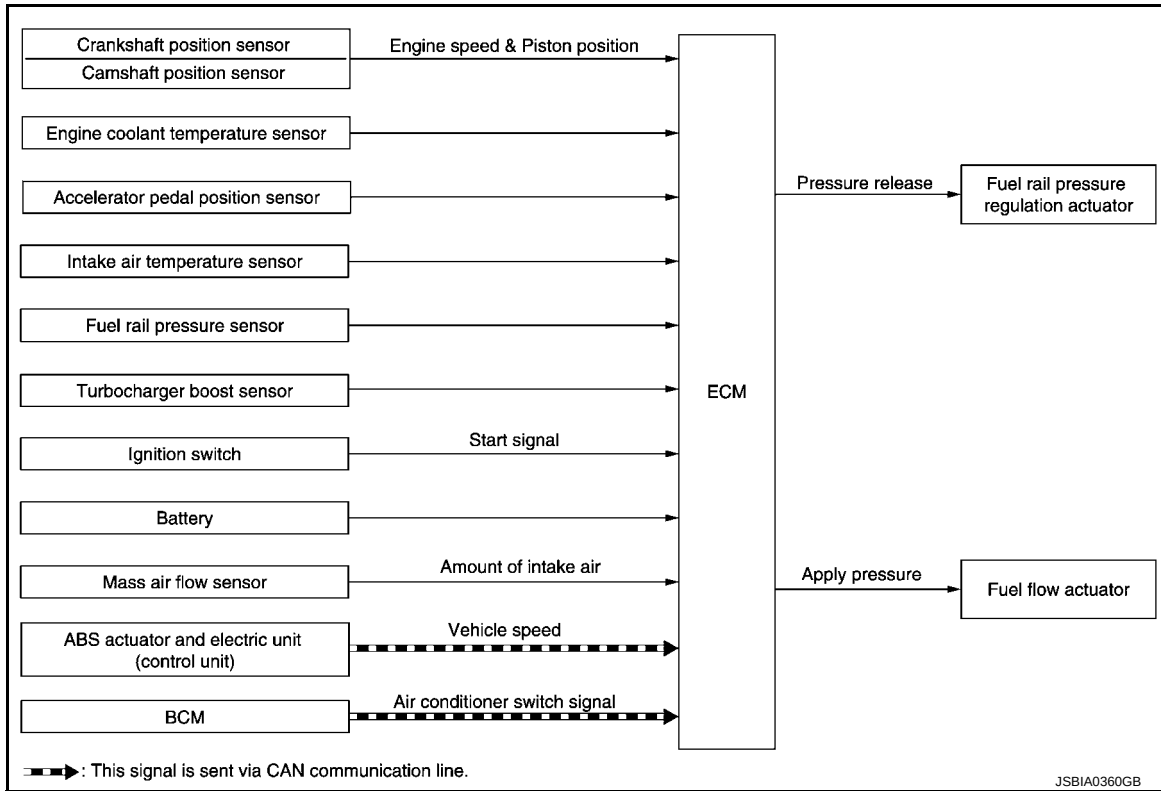
SYSTEM DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

FUEL RAIL PRESSURE CONTROL

FUEL RAIL PRESSURE CONTROL : System Diagram

INFOID:000000006466423



FUEL RAIL PRESSURE CONTROL : System Description

INFOID:000000006466424

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel rail pressure control	- Fuel rail pressure regulation actuator - Fuel flow actuator
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature sensor	Intake air temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		
Ignition switch	Start signal		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
ABS actuator and electric unit (control unit)	Vehicle speed*		
BCM	Air conditioner switch signal*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION

ECM decides fuel rail pressure based on signal from fuel rail pressure sensor. And ECM controls fuel flow actuator and fuel rail pressure regulation actuator, and adjusts fuel rail pressure according to drive condition. Fuel rail pressure is mainly adjusted by fuel flow actuator, and fuel rail pressure regulation actuator operates mainly at following conditions.

- At engine starting
Fuel flow actuator is fully open and fuel rail pressure is adjusted by fuel rail pressure regulation actuator.
- When vehicle speed is decelerating

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

Fuel rail pressure regulation actuator is opened and it minimizes excessive fuel leak from fuel injector by instantly returning fuel.

- When fuel flow actuator is malfunctioning

The fuel flow actuator commanded while fully open and regulation ensured in downgraded mode by the fuel rail pressure regulation actuator.

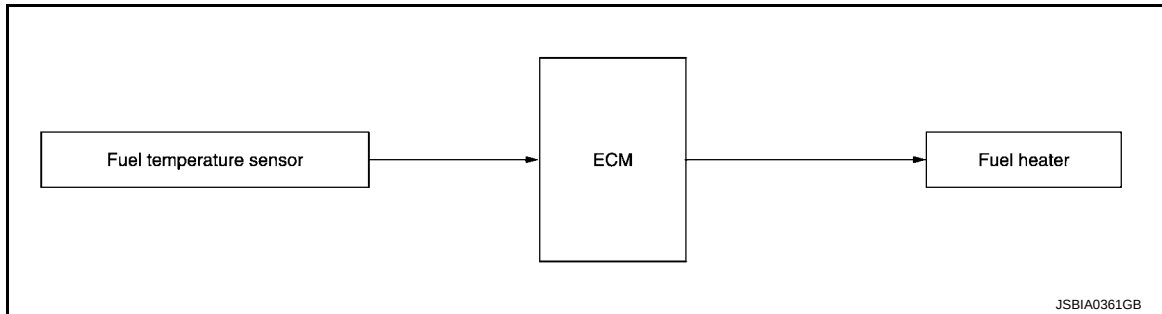
The fuel flow actuator is controlled fully open, and fuel rail pressure is regulated in downgraded mode by the fuel rail pressure regulation actuator.

Furthermore, Fuel Pressure Holding Valve is installed in fuel injector return circuit adjusts the pressure at approximately 1 MPa (10.2 kg/cm², 10 bar, 145 psi) in fuel injector after return.

FUEL HEATER CONTROL

FUEL HEATER CONTROL : System Diagram

INFOID:0000000006466425



FUEL HEATER CONTROL : System Description

INFOID:0000000006466426

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Fuel temperature sensor	Fuel temperature	Fuel heater control	Fuel heater

SYSTEM DESCRIPTION

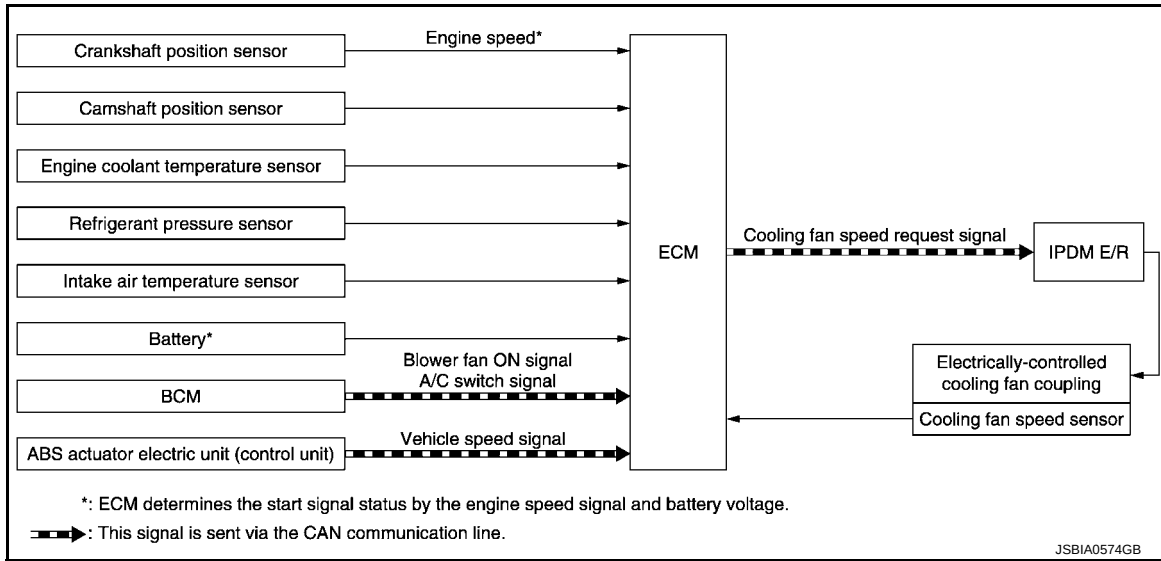
ECM detects fuel temperature based on signal from fuel temperature sensor and switches ON/OFF fuel heater relay in following conditions to operate fuel heater.

Fuel temperature	Fuel heater operation condition
Below Approx. 17°C (63°F)	ON
Approx. 17°C (63°F) or more	OFF
Temperature decreases from 17°C (63°F) or more to Approx. 7°C (45°F)	OFF⇒ON

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:000000006466427



COOLING FAN CONTROL : System Description

INFOID:000000006466428

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed* ¹	Cooling fan speed request signal* ²	IPDM E/R ↓ Electrically-controlled cooling fan coupling
Camshaft position sensor	Camshaft position* ¹		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Intake air temperature sensor	Intake air temperature		
Battery	Battery voltage* ¹		
ABS actuator electric unit (control unit)	Vehicle speed signal* ²		
BCM	A/C switch signal* ² Blower fan ON signal* ²		
Cooling fan speed sensor	Cooling fan speed request signal		

*1: The ECM determines the engine speed by the signals of crankshaft position and camshaft position.

*2: This signal is sent via the CAN communication line.

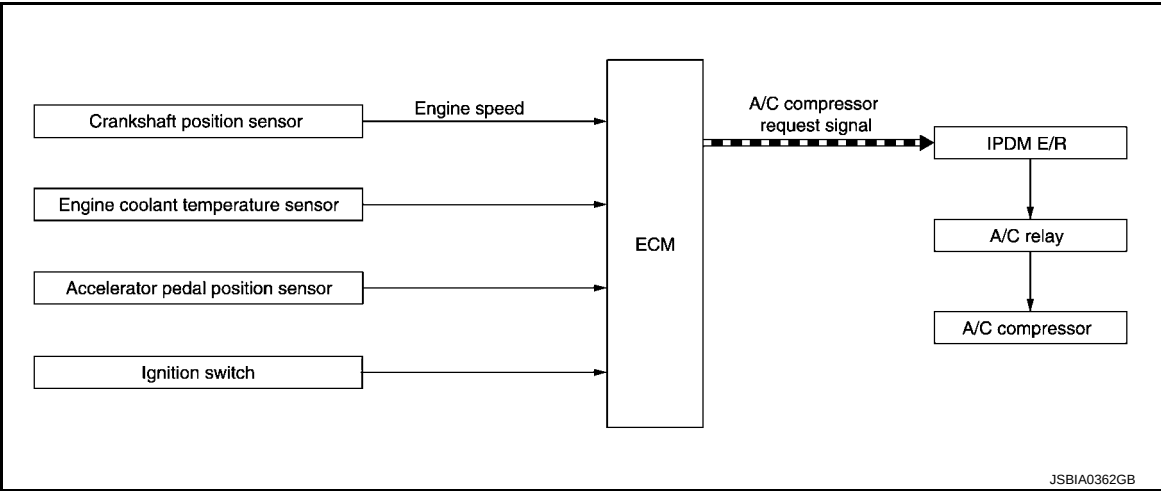
SYSTEM DESCRIPTION

- Based on a signal transmitted from each sensor, ECM calculates a target fan speed responsive to a driving condition. In addition, ECM calculates a fan pulley speed according to an engine speed and transmits a cooling fan speed request signal to IPDM E/R via the CAN communication line to satisfy the target fan speed. Then, IPDM E/R transmits ON/OFF pulse duty signal to electric control coupling. The cooling fan speed sensor detects a cooling fan speed and transmits the detection result to ECM.
- ECM judges the start signal state from the engine speed signal and battery voltage.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:000000006466429



AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000006466430

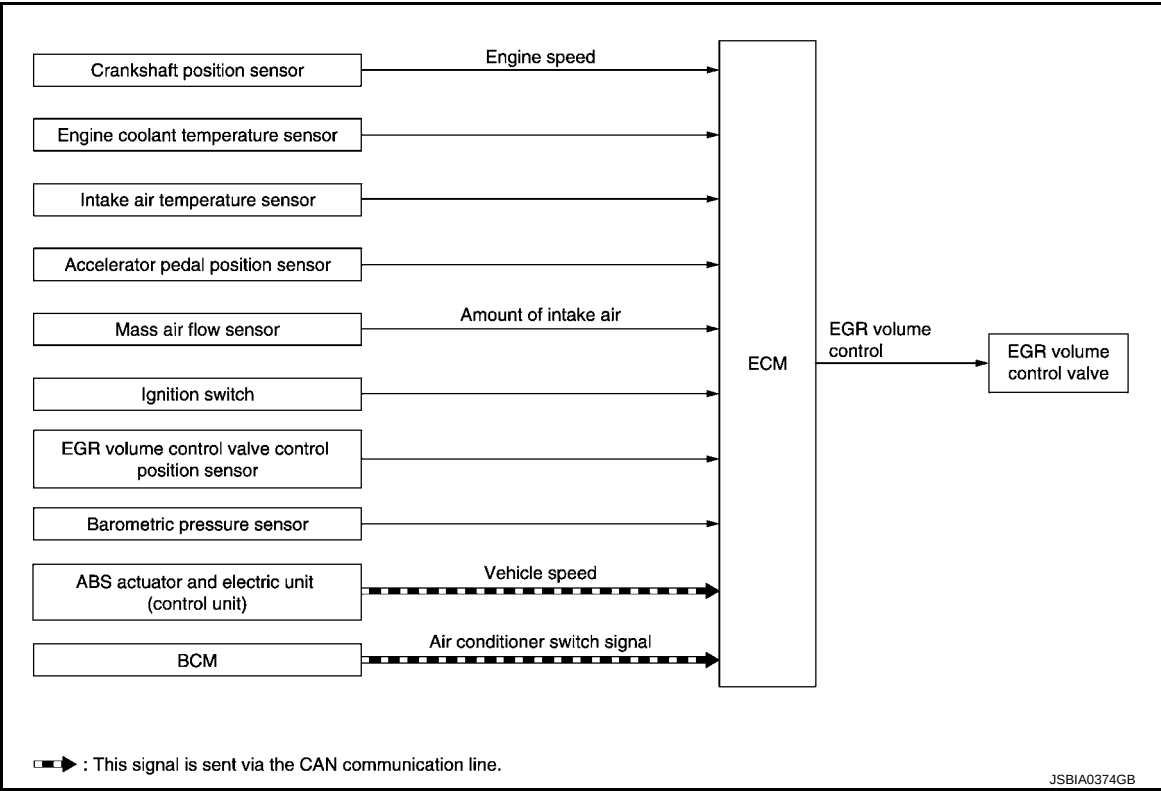
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Air conditioning cut control	IPDM E/R ↓ A/C relay ↓ A/C compressor
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		

EGR SYSTEM

EGR SYSTEM : System Diagram

INFOID:000000006466431



EGR SYSTEM : System Description

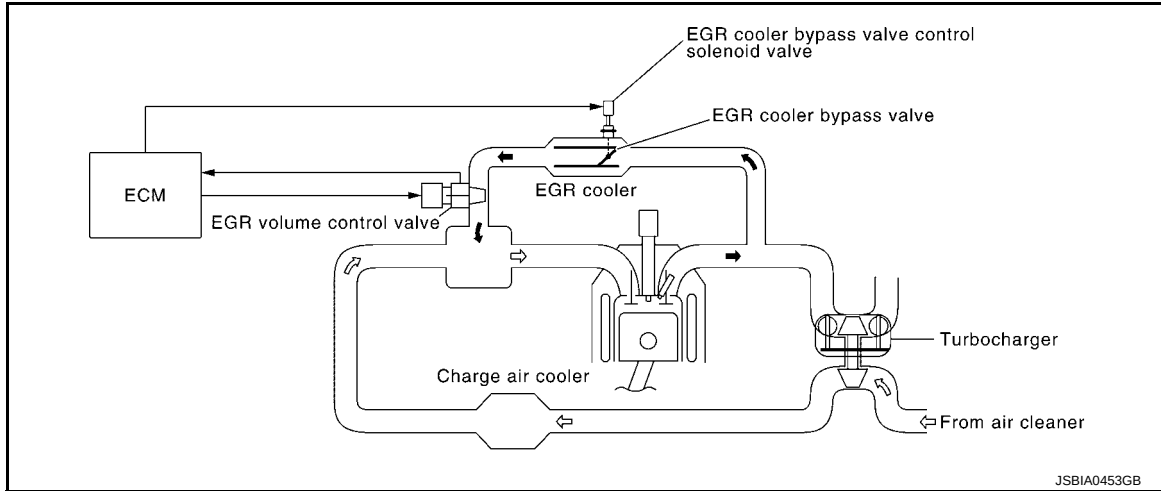
INFOID:000000006466432

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Mass air flow sensor	Amount of intake air		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		
EGR volume control valve position sensor	EGR volume control valve position		
Barometric pressure sensor	Barometric pressure		
ABS actuator and electric unit (control unit)	Vehicle speed*		
BCM	Air conditioner switch signal*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION



EGR VOLUME CONTROL

This system controls the flow rate of EGR led from exhaust manifold to intake manifold.

The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate.

A built-in DC motor moves the valve continuously corresponding to the ECM output signal.

The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM.

The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening angle of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped*
- Specified period of time after engine starting (depending on engine coolant temperature)
- Low engine coolant temperature
- Battery voltage too low
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

*: EGR volume control valve operates several times soon after engine stopped to prevent clogging.

EGR COOLER CONTROL

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

EGR cooler efficiently cools down the gas circulated in EGR system, and decreasing combustion temperature reduces NOx in exhaust gas. Furthermore, EGR cooler bypass valve is installed for efficient combustion temperature increase at engine starting and for improvement of combustion stability at low load.

EGR cooler bypass has an open/close control; ECM controlled EGR cooler bypass valve control solenoid valve switches the open/close status by regulating negative pressure applied to EGR cooler bypass valve diaphragm.

EGR cooler bypass is controlled depending on engine load and engine coolant temperature.

Example of operation

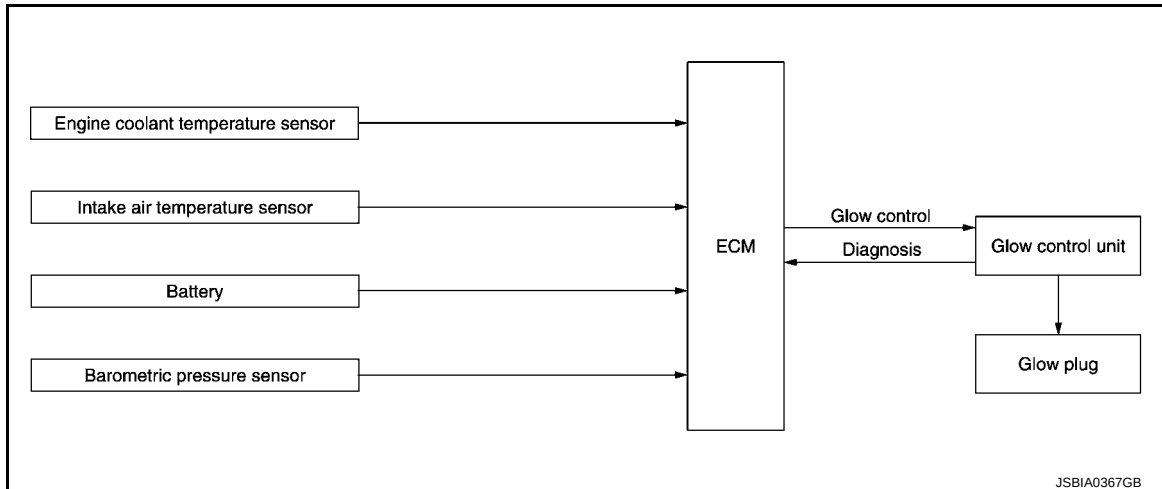
Condition	EGR cooler bypass valve
Ignition switch OFF	OFF (cooler mode)
Engine idling and engine coolant temperature is 110°C (230°F) and below	ON (bypass mode)
Engine speed is 2200 rpm and above (no load) and engine coolant temperature is 45°C (113°F) and above	OFF (cooler mode)

The installation of EGR cooling water pump enables the constant feeding of engine coolant to the EGR cooler while the engine is running.

GLOW CONTROL

GLOW CONTROL : System Diagram

INFOID:000000006466433



JSBIA0367GB

GLOW CONTROL : System Description

INFOID:000000006466434

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Glow control	Glow control unit ↓ Glow plug
Intake air temperature sensor	Intake air temperature		
Battery	Battery voltage		
Barometric pressure sensor	Barometric pressure		

SYSTEM DESCRIPTION

Glow control system operates at engine starting and after engine starting. The system energizes glow plug according to engine coolant temperature to improve engine starting function.

When the ignition switch is turned ON, the glow control system starts Pre-glow and the glow indicator lamp turns ON. When the engine starts, the glow indicator lamp turns OFF and the glow control state changes to After-glow.

Glow time varies according to engine coolant temperature, intake air temperature, barometric pressure and battery voltage.

Reference value

SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

Unit: Second

Engine coolant temperature	Pre-glow (Approx.)	After-glow (Approx.)
-10°C (14°F)	1.9	120 – 250
0°C (32°F)	1.7	90 – 180
10°C (50°F)	1.5	90 – 120
20°C (68°F)	1.0	90 – 200

After-glow does not operate under the condition the engine coolant temperature is 50°C (122°F) or more.

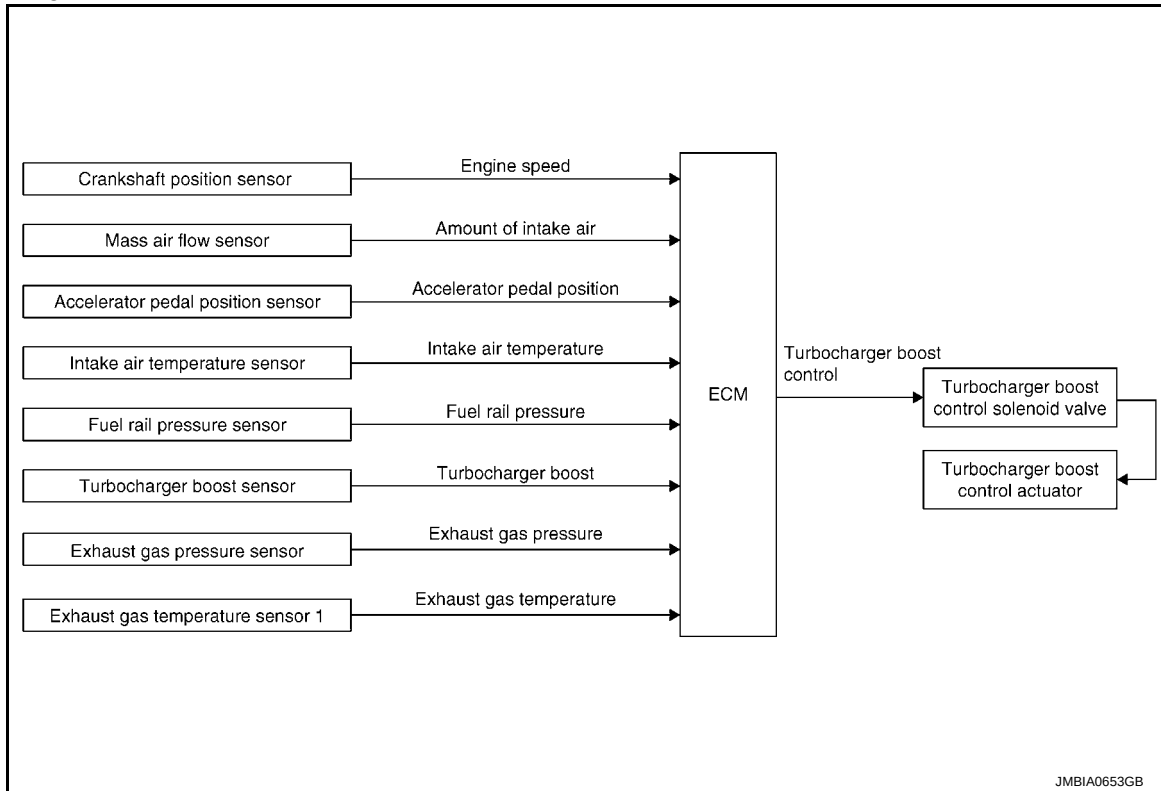
TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Description

INFOID:000000006466435

TURBOCHARGER BOOST CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Turbocharger boost control	Turbocharger boost control solenoid valve ↓ Turbocharger boost control actuator
Mass air flow sensor	Amount of intake air		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature sensor	Intake air temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		
Exhaust gas pressure sensor 1	Exhaust gas pressure		
Exhaust gas temperature sensor 1	Exhaust gas temperature before turbine		

SYSTEM DESCRIPTION

Turbocharger boost control solenoid valve is operated by ON/OFF signals (pulse signals) from ECM.

SYSTEM

< SYSTEM DESCRIPTION >

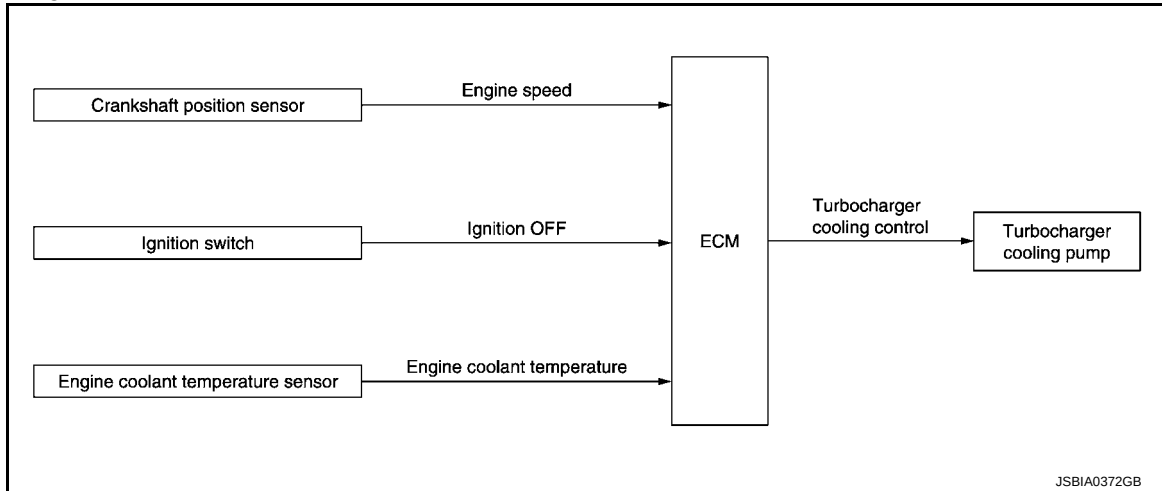
[V9X]

Output signal to turbocharger boost control solenoid valve is feedback controlled to obtain the optimum boost pressure so that the amount of intake air detected by mass air flow sensor is equal to the target amount decided by engine revolution and injected amount of fuel.

Under the driving condition of increasing boost pressure, ON time rate of turbocharger boost control solenoid valve is increased by ECM signal to shift the nozzle vane in closing direction. Under the driving condition of decreasing boost pressure, ON time rate of turbocharger boost control solenoid valve is decreased by ECM signal to shift the nozzle vane in opening direction.

TURBOCHARGER COOLING CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Turbocharger cooling control	Turbocharger cooling pump
Ignition switch	Ignition OFF		
Engine coolant temperature sensor	Engine coolant temperature		

SYSTEM DESCRIPTION

To prevent high oil temperature around turbine bearing, cooling water is circulated around the bearing using turbocharger cooling pump.

Excessively high oil temperature causes the change of oil viscosity property resulting in bearing seizure.

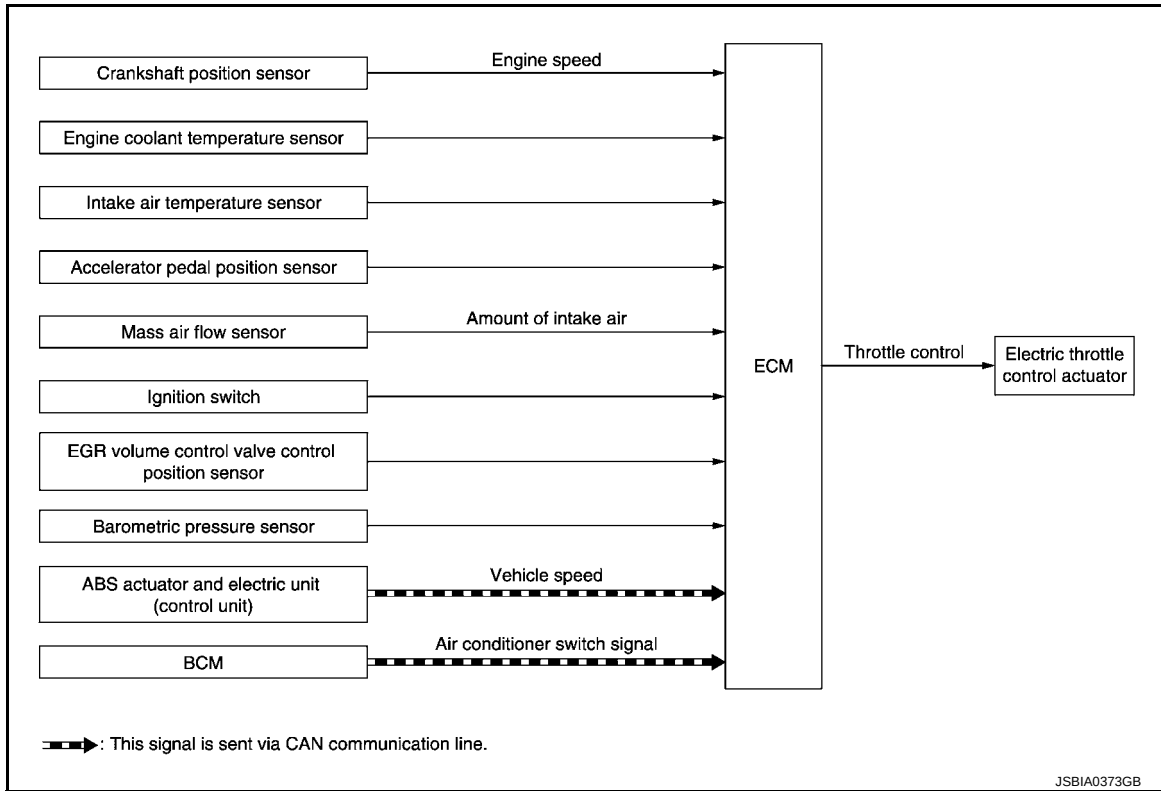
ECM monitors engine coolant temperature during approximately 3 minutes after turning ignition switch OFF.

When it exceeds a specified temperature, ECM operates TC cooling pump for 10 minutes maximum.

THROTTLE CONTROL

THROTTLE CONTROL : System Diagram

INFOID:000000006466436



THROTTLE CONTROL : System Description

INFOID:000000006466437

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Throttle control	Electric throttle control actuator
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Ignition switch	Start signal and ignition OFF		
EGR volume control valve position sensor	EGR volume control valve position		
Barometric pressure sensor	Barometric pressure		
ABS actuator and electric unit (control unit)	Vehicle speed*		
BCM	Air conditioner switch signal*		

*: This signal is sent via CAN communication line.

SYSTEM DESCRIPTION

Throttle valve is fully open at normal condition. When ignition switch is turned OFF, throttle valve is closed to stop the engine smoothly. Furthermore, the electric throttle control actuator learns open/close position by operating throttle valve after engine stop.

ELECTRONIC CONTROLLED ENGINE MOUNT

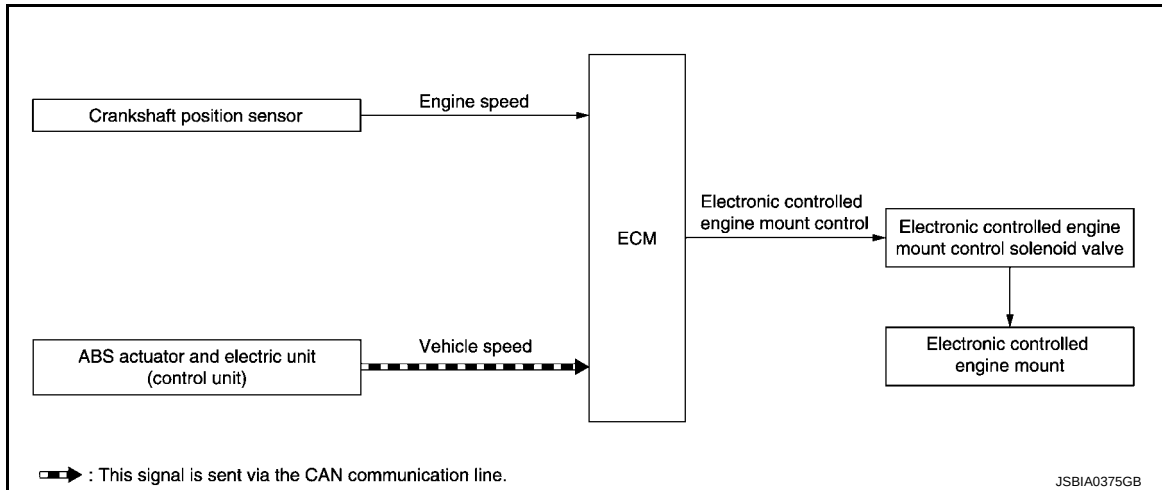
SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

ELECTRONIC CONTROLLED ENGINE MOUNT : System Diagram

INFOID:000000006466438



ELECTRONIC CONTROLLED ENGINE MOUNT : System Description

INFOID:000000006466439

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Electronic controlled engine mount control	Electronic controlled engine mount control solenoid valve
ABS actuator and electric unit (control unit)	Vehicle speed*		↓ Electronic controlled engine mount

*: This signal is sent to the ECM via CAN communication line.

SYSTEM DESCRIPTION

Electronic controlled engine mount system operates following controls to improve quietness at idling and ride comfort at driving.

At Idling

ECM turns the electronic controlled engine mount control solenoid valve to ON to release negative pressure from vacuum pump to air. And negative pressure is discharged from engine mount. This flow reduces vibration and noise.

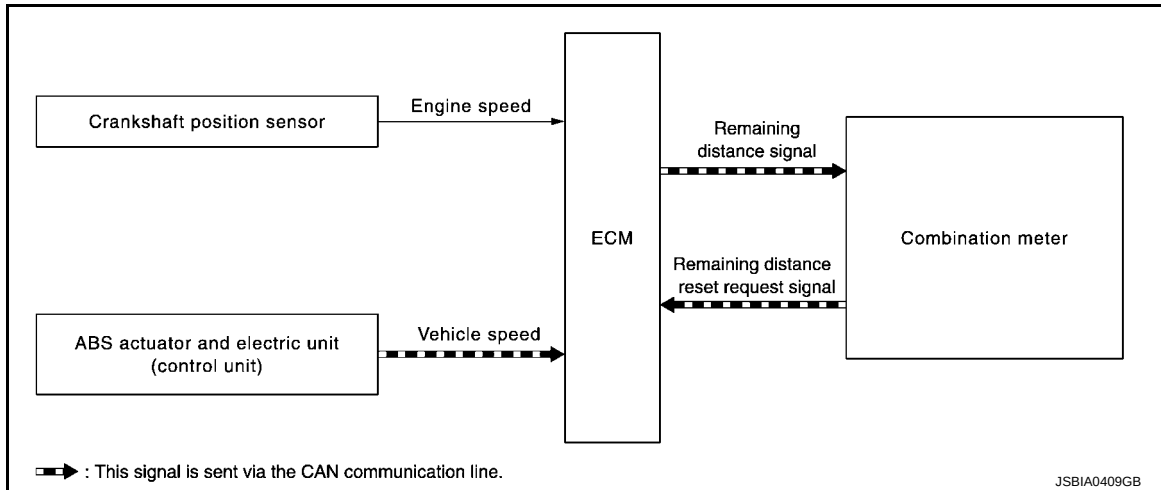
At driving

ECM turns the electronic controlled engine mount control solenoid valve OFF. Negative pressure from vacuum pump fixes engine mount. This induces high damping force to improve riding comfort.

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : System Diagram

INFOID:000000006466440



OIL CONTROL SYSTEM : System Description

INFOID:000000006466441

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Oil control	Combination meter ↓ ↑ ECM
ABS actuator electric unit (control unit)	Vehicle speed		

SYSTEM DESCRIPTION

ECM calculates oil degradation based on engine speed and vehicle speed, and displays engine oil change timing on combination meter.

When the mileage before engine oil change comes to approximately 1500 km or less, pre-alert message is displayed to inform the driver that the maintenance timing is close. Furthermore, when the timing is passed, alert message is displayed to inform the driver that engine oil change is necessary.

At oil change, the mileage must be reset using vehicle information display function.

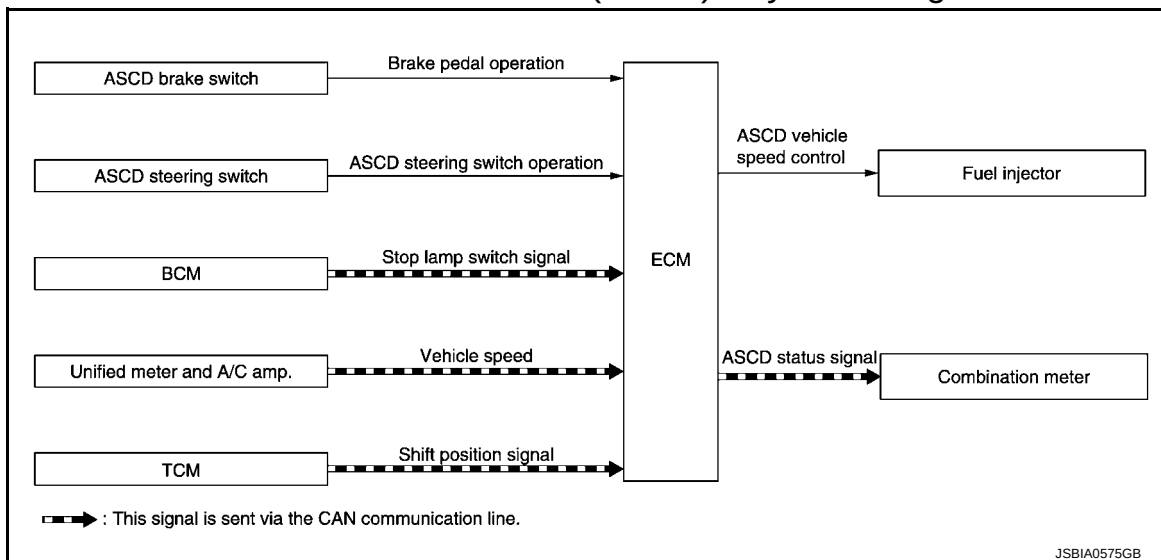
NOTE:

Alerted mileage might be different from actual mileage.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:000000006466442



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000006466443

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	- Fuel injector - Combination meter (Information display)
ASCD steering switch	ASCD steering switch operation		
BCM	Stop lamp switch signal*		
Unified meter and A/C amp.	Vehicle speed*		
TCM	Shift position signal*		

*: This signal is sent via the CAN communication line.

BASIC ASCD SYSTEM

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 30 km/h (20 MPH) and 200 km/h (125 MPH).

ECM controls fuel injector to regulate engine speed.

Operation status of ASCD is indicated on the information display in the combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press ASCD MAIN switch. (CRUISE indicated on the information display)

When vehicle speed reaches a desired speed between approximately 30 km/h (20 MPH) and 200 km/h (125 MPH), press SET / – switch. (SET indicated on the information display)

ACCELERATE OPERATION

If the RES / + switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will maintain the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches on ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever position is N, P or R position
- TCS system is operated

When the ECM detects malfunction for some self-diagnoses regarding ASCD system, the ECM will cancel the cruise operation and inform the driver by blinking SET indicator lamp quickly.

If ASCD MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET / – switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

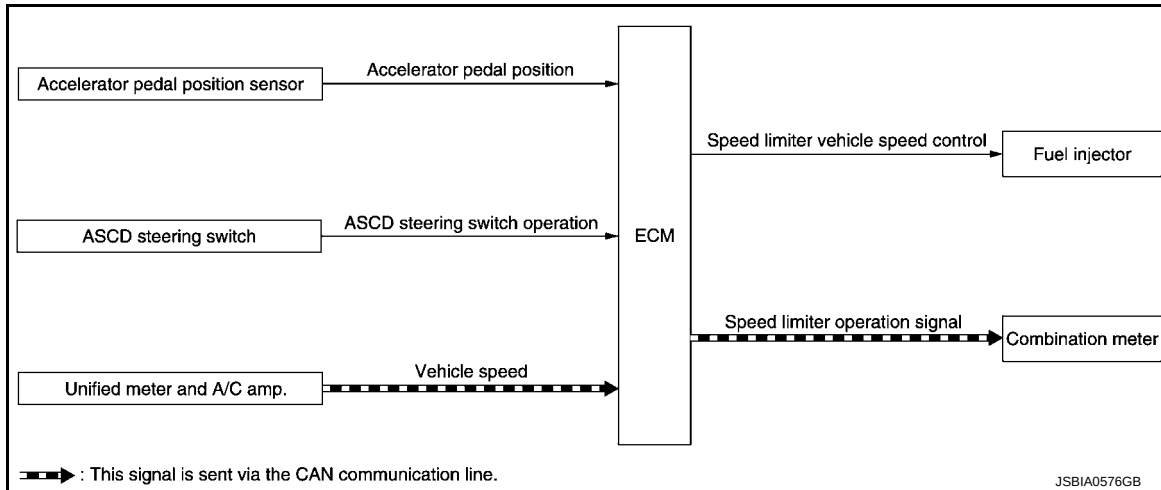
When the RES / + switch is pressed after canceling operation other than pressing the ASCD MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Selector lever position is P or N
- Vehicle speed is greater than 30 km/h (20 MPH) and less than 200 km/h (125 MPH)

SPEED LIMITER

SPEED LIMITER : System Diagram

INFOID:000000006466444



SPEED LIMITER : System Description

INFOID:000000006466445

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Speed limiter vehicle speed control	- Fuel injector - Combination meter (Information display)
ASCD steering switch	ASCD steering switch operation		
Unified meter and A/C amp.	Vehicle speed*		

*: This signal is sent via CAN communication line.

BASIC SPEED LIMITER SYSTEM

The speed limiter is a system that enables to restrict the vehicle speed within the set speed that is selected by the driver. Driver can set vehicle speed between 30 km/h and 200 km/h (in the metric system mode) or 20 MPH and 125 MPH (in the yard/pound system mode). ECM controls fuel injector to regulate vehicle speed. Operation status of speed limiter is indicated on the information display in the combination meter. Refer to [EC-1237, "Information Display"](#). If any malfunction occurs in speed limiter system, it automatically deactivates control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press speed limiter MAIN switch. (LIMIT indicated on the information display)

By pressing the SET / – switch, the vehicle speed can be set within the range between 30 km/h and 200km/h (in the metric system mode) or 20 MPH and 125 MPH (in the yard/pound system mode). (SET and set speed is indicated on the information display)

When pressing the RES / + switch, the set speed can be increased.

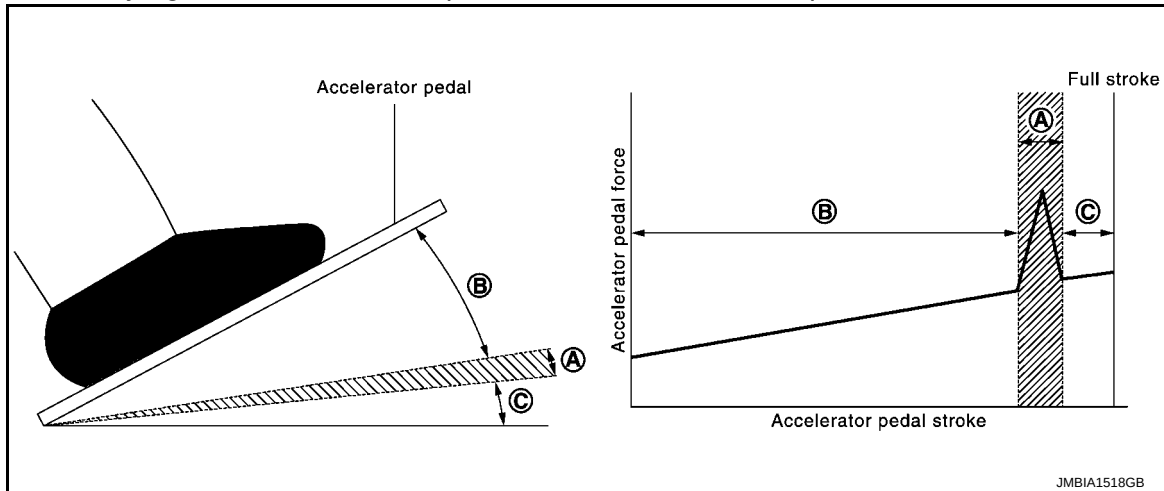
When pressing the SET / – switch, the set speed can be decreased.

CANCEL OPERATION

When any of following conditions exist, speed limiter operation will be canceled.

- Speed limiter MAIN switch pressed (Set speed will be cleared)
- ASCD MAIN switch pressed (Set speed will be cleared)
- CANCEL switch is pressed
- Accelerator pedal is fully depressed (kickdown)

When depressing the accelerator pedal, there is a specific point (A) in the pedal stroke where the pedal force increases as shown in the figure. When depressing the accelerator pedal continuously exceeding the point, the ECM judges that a kickdown is performed and releases the speed limiter.



RESUME OPERATION

After the speed limiter is released by other method than the speed limiter MAIN switch, the RES / + switch allows to set the vehicle speed again to the one that is previously set before releasing the speed limiter.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000006466446

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H-line, CAN L-line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-49, "CAN Communication Signal Chart"](#), about CAN communication for detail.

OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

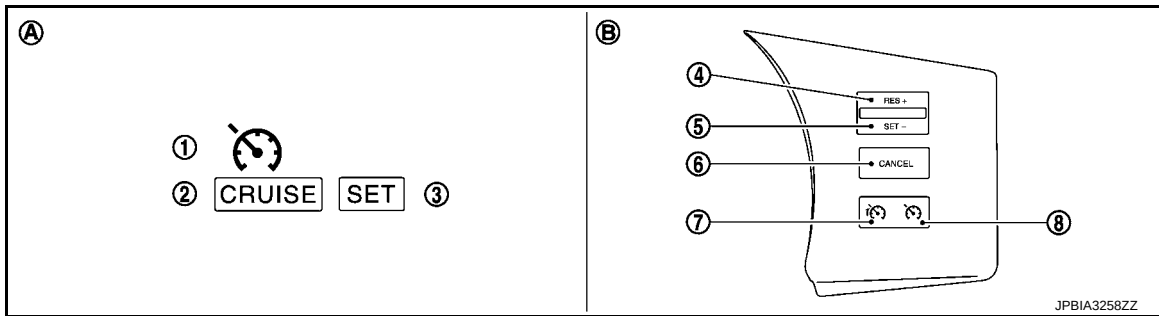
AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:000000006466447

SWITCHES AND INDICATORS

NOTE:

Shared with speed limiter switch.



1. CRUISE symbol	2. CRUISE indicator	3. SET indicator
4. RESUME/ACCELERATE switch (RES / +)	5. SET/COAST switch (SET / -)	6. CANCEL switch
7. Speed limiter MAIN switch	8. ASCD MAIN switch	
A. On the combination meter (Information display)	B. On the steering wheel	

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
30 km/h (20 MPH)	200 km/h (125 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
RESUME/ACCELERATE switch (RES / +)	- Resumes the set speed. (SET indicator is turned ON when cruise control is set.) - Increases speed incrementally during cruise control driving.
SET/COAST switch (SET / -)	- Sets desired cruise speed. (SET indicator is turned ON when cruise control is set.) - Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system. (CRUISE symbol and CRUISE indicator are turned ON when ASCD system is ON.)

CANCEL CONDITION

- When any of following conditions exist, the cruise operation is canceled.
 - CANCEL switch is pressed
 - More than 2 switches on ASCD steering switch are pressed at the same time (Set speed is cleared)
 - Brake pedal is depressed
 - Selector lever position is changed to N, P or R position
 - TCS system is operated
- When the ECM detects malfunction for some self-diagnoses regarding ASCD system, the ECM will cancel the cruise operation and inform the driver by blinking SET indicator lamp quickly.
- If ASCD MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

SPEED LIMITER

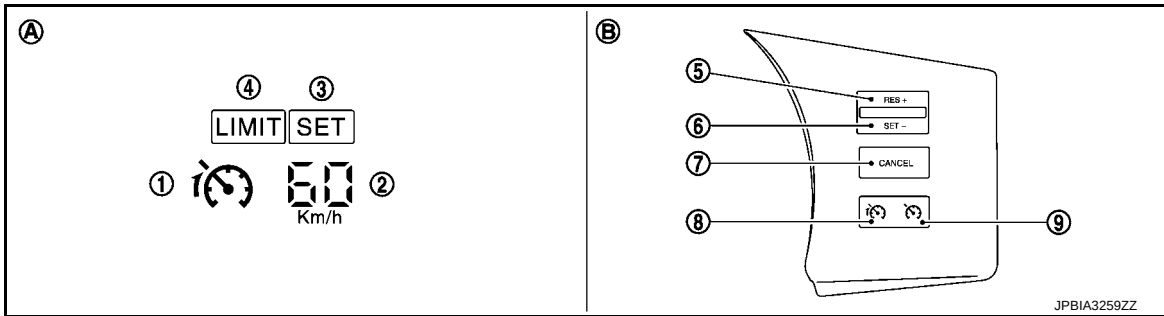
SPEED LIMITER : Switch Name and Function

INFOID:000000006466448

SWITCHES AND INDICATORS

NOTE:

Shared with ASCD switch.



1. Speed limiter indicator lamp	2. SET speed indicator	3. Set indicator
4. LIMIT indicator	5. RESUME/ACCELERATE switch (RES / +)	6. SET/COAST switch (SET / -)
7. CANCEL switch	8. Speed limiter MAIN switch	9. ASCD MAIN switch
A. On the combination meter (Information display)	B. On the steering wheel	

SET SPEED RANGE

Speed limiter system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
30 km/h (20 MPH)	200 km/h (125 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the speed limiter control.
RESUME/ACCELERATE switch (RES / +)	- Resumes the set speed. (SET indicator is turned ON when speed limiter is set.) - Increases the set speed incrementally.
SET/COAST switch (SET / -)	- Sets desired speed. (SET indicator is turned ON when speed limiter is set.) - Decreases the set speed incrementally.
Speed limiter MAIN switch	Master switch to activate the speed limiter system. (Speed limiter symbol, speed limiter indicator and set speed indicator are turned ON when speed limiter system is ON.)

CANCEL CONDITION

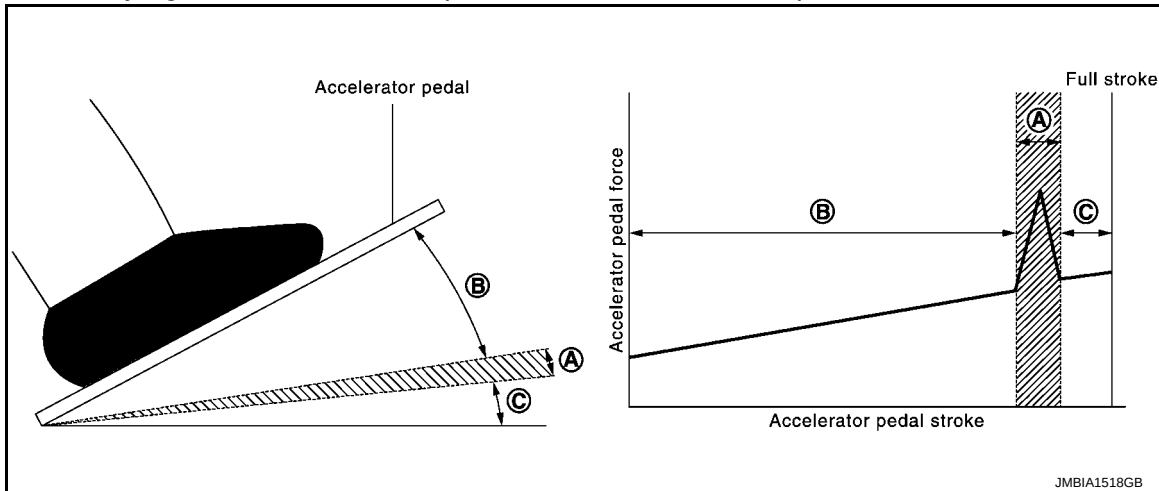
- When any of following conditions exist, speed limiter operation is canceled.
 - Speed limiter MAIN switch pressed (Set speed is cleared)
 - ASCD MAIN switch pressed (Set speed is cleared)
 - CANCEL switch is pressed
 - Accelerator pedal is fully depressed (kickdown)

OPERATION

< SYSTEM DESCRIPTION >

[V9X]

- When depressing the accelerator pedal, there is a specific point (A) in the pedal stroke where the pedal force increases as shown in the figure. When depressing the accelerator pedal continuously exceeding the point, the ECM judges that a kickdown is performed and cancels the speed limiter.



OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : Reset Operation

INFOID:000000006466449

RESET OPERATION

CAUTION:

When an alert was displayed, change the engine oil, and reset the engine oil data.

1. Turn the ignition switch ON.
2. Check that oil service message is displayed, and turn the ignition switch OFF.
3. Turn the ignition switch ON, and within 3 seconds, simultaneously push the odo/trip meter switch and the clock switch at least for 5 seconds.
4. Check that a new maintenance interval is displayed on the odo/trip meter display.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:000000006466450

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	ISO Standard
Diagnostic Trouble Code (DTC)	Service \$03 of ISO 15031-5
Calibration ID	Service \$09 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable	
	DTC
CONSULT-III	×
GST	×

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in three consecutive trips (Three trip detection logic).

DETECTION LOGIC

When a malfunction is detected, DTC is saved in the ECM memory. MI does not illuminate at this stage. MI illuminates when the same malfunction occurs in 3 consecutive trips.

When DTC is detected, check, print out or write down, and erase DTC as specified with step 2 of Work Flow, refer to [EC-1309, "Work Flow"](#). Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, it is necessary to investigate the cause again.

How to Read DTC

DTC can be read by the following procedures.

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool): Examples: P0016, P0335, P0606, etc.

These numbers are prescribed by ISO 15031-6.

(CONSULT-III also displays the malfunctioning parts and systems.)

How to Erase DTC

With CONSULT-III

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 4 minutes and then turn it ON (engine stopped) again.

1. Turn ignition switch ON.(engine stopped)
2. Select "ENGINE" with CONSULT-III.
3. Select "SELF-DIAG RESULTS".
4. Touch "ERASE". (DTC in ECM will be erased.)

With GST

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 4 minutes and then turn it ON (engine stopped) again.

1. Turn ignition switch ON.(engine stopped)
 2. Select Service \$04 with GST (Generic Scan Tool).
- **If the battery is disconnected, the emission-related diagnostic information will be cleared within 24 hours.**
 - **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

MALFUNCTION INDICATOR (MI)

Description

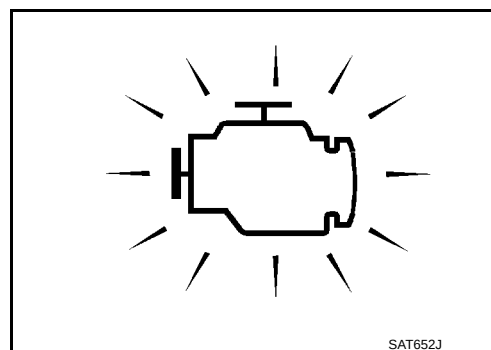
ON BOARD DIAGNOSTIC (OBD) SYSTEM

[V9X]

< SYSTEM DESCRIPTION >

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
2. When the engine is started, the MI should go off.
If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb.

Diagnostic Test Mode I — Malfunction Warning

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

OBD SYSTEM OPERATION CHART

Relationship Between MI, DTC, and Detectable Items

- When the malfunction is detected for the first time, DTC is stored in the ECM memory.
- When the same malfunction is detected during 3rd consecutive trip, MI illuminates.
- MI will go off after the vehicle is driven 3 consecutive times with no malfunction (Driving pattern A).
- DTC will be stored until the vehicle is driven 41 times (Driving pattern B) without the same malfunction recurring.

Summary Chart

Items	Trip	Counter	Driving Pattern
MI (goes off)	3	0	A
DTC (clear)	41	0	B

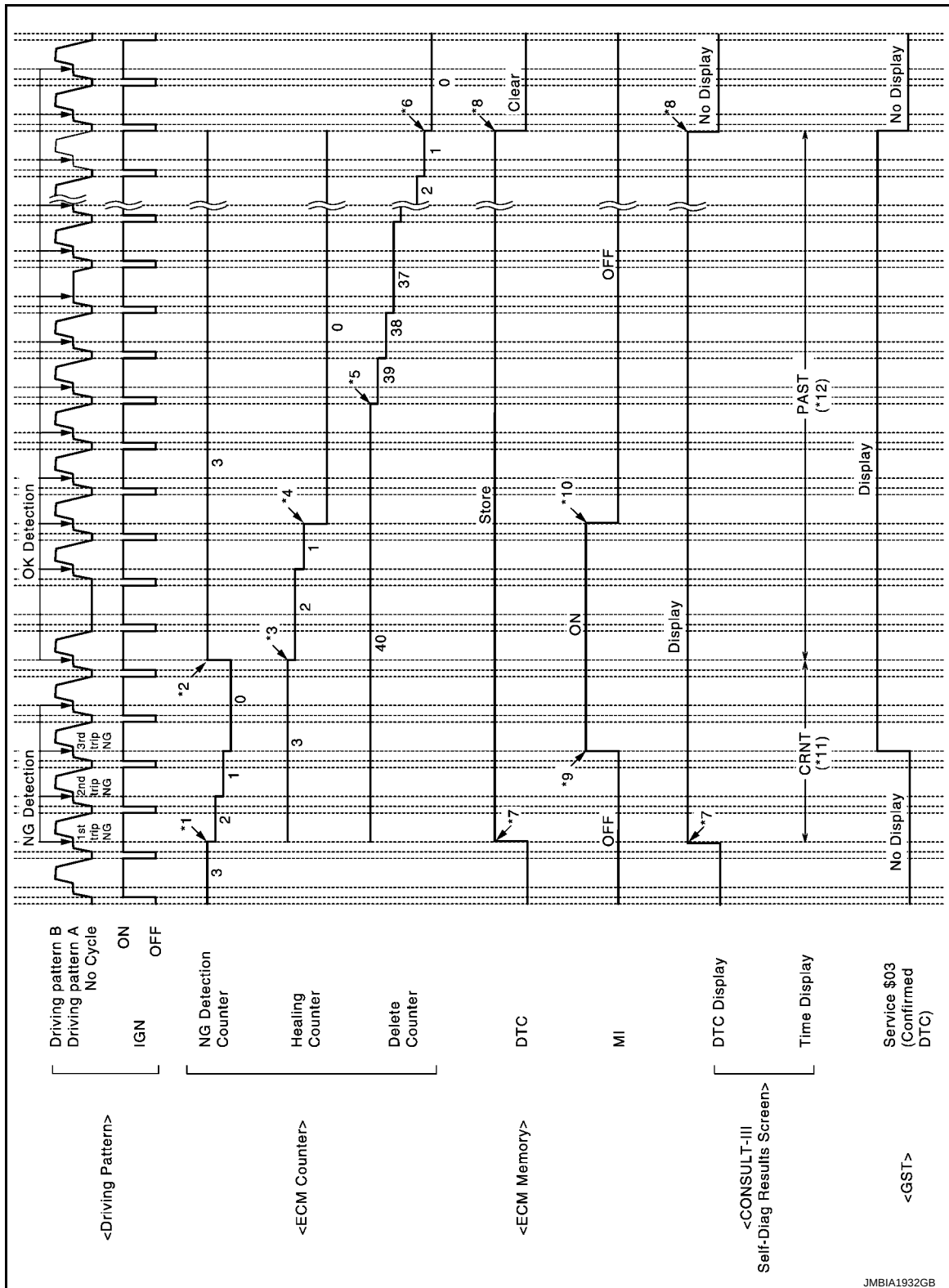
Refer to "RELATIONSHIP BETWEEN MI, DTC and DRIVING PATTERNS" for details of pattern A and B.

Relationship Between MI, DTC and Driving Patterns

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[V9X]



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- *1: When the ECM satisfies driving pattern A and detects the NG detection, the NG detection counter is decrement.
- *2: When the ECM satisfies driving pattern A and detects OK detection, the NG detection counter is increment.
- *3: When the ECM satisfies driving pattern A and detects OK detection, the healing counter is decrement.
- *4: When the ECM detects OK detection and elapses 2 driving cycles, the healing counter will be reached to 0.
- *5: When the ignition switch OFF after the ECM satisfies driving pattern B and detects OK detection, the delete counter is decrement.
- *6: When the ECM detects OK detection and elapses 40 driving pattern B, the delete counter will be reached to 0.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

- *7: When the ECM detects NG detection, DTC is stored.
- *8: When the detect counter is reached to 0, DTC is cleared.
- *9: When the same malfunction is detected in 3 consecutive trips, MI will light up.
- *10: MI will go off after vehicle is driven 3 times (driving pattern A) without any malfunctions.
- *11: When the ECM detects NG detection, the time "CRNT" will be displayed in the CONSULT-III Self diagnostic screen.
- *12: When the ECM detects NG detection, the time "PAST" will be displayed in the CONSULT-III Self diagnostic screen.

<Driving Pattern A>

Driving pattern A means the vehicle operation as follows:

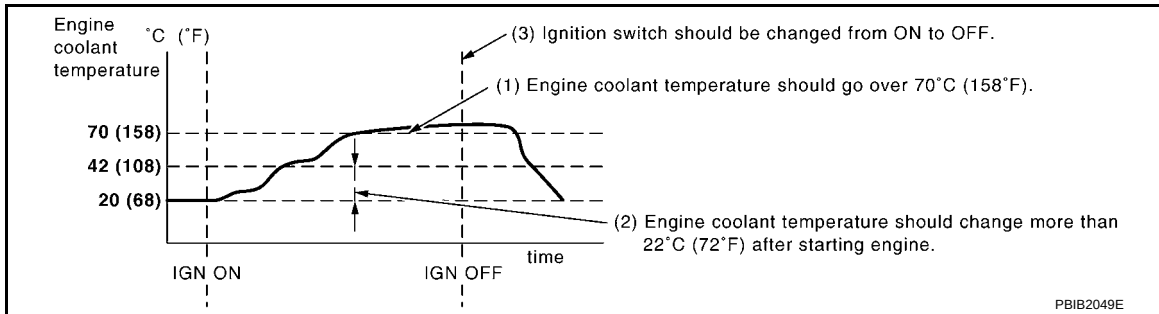
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The healing counter will be set when the malfunction is detected.
- The healing counter will be decrement when the same malfunction is not detected.
- The MI will go off when the healing counter reaches 0.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

Driving pattern A and (1)-(3) are satisfied.



- The delete counter will be cleared when the malfunction is detected.
- The delete counter will be decrement when the same malfunction is not detected.
- The DTC will not be displayed after the delete counter reaches 0.

CONSULT-III Function

INFOID:000000006466451

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as DTC can be read and erased quickly.
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function Test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
Ecu Identification	ECM part number and homologation number can be read.

WORK SUPPORT MODE

Work Item

Work item	Description	Usage
INJ ADJ VAL REGIST	In this mode, fuel injector adjustment value is registered.	• When ECM is replaced.* • When fuel injector(s) is replaced.
EGR/V LEARN CLR	In this mode, EGR volume control valve closed position learning is cleared.	When EGR volume control valve is removed or replaced.
TP POS LEARN CLR	In this mode, throttle valve closed position learning is cleared.	When electric throttle control actuator is removed or replaced.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[V9X]

< SYSTEM DESCRIPTION >

Work item	Description	Usage
SAVE DATA FOR CPU REPLC	In this mode, save data that is in ECM.	When ECM is replaced.*
WRT DATA AFTR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM.	When ECM is replaced.*
ZFC VALUE RESET	In this mode, ZFC (Zero Fuel Calibration) and NVC (Nominal Voltage Calibration) are reset.	• When ECM is replaced.* • When fuel injector(s) is replaced.

*: The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313, "Description"](#).

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to — [EC-1288, "DTC Index"](#).

DATA MONITOR MODE

Monitor item	Unit	Condition	Specification
CRUISE CONT SW	ON/OFF	Indicates [ON/OFF] condition from ASCD MAIN switch signal.	
SPEED LIMITER SW	ON/OFF	Indicates [ON/OFF] condition from speed limiter MAIN switch signals.	
CC/SL STR SW	RELEASES/INVALID/OPEN/ CANCEL/SET/-/RES/+/ RESUM	Steering switch condition is displayed. • RELEASES: Not pressed • INVALID: Invalid voltage • OPEN: Open circuit • CANCEL: CANCEL switch is pressed • SET/-: SET / - switch is pressed • RES/+: RES / + switch is pressed • RESUM: RES switch is pressed	
TC COOL W/P STAT	ON/OFF	Turbocharger cooling water pump condition is displayed. • ON: Turbocharger cooling water pump is operated. • OFF: Turbocharger cooling water pump is not operated.	
EGR C/P STATUS	ON/OFF	EGR cooling water pump condition is displayed. • ON: EGR cooling water pump is operated. • OFF: EGR cooling water pump is not operated.	
EGR COOL BYPAS/V	INACT/ACTIV	EGR cooler bypass valve control solenoid valve status is displayed. • INACT: EGR cooler bypass valve control solenoid valve is not operated. • ACTIV: EGR cooler bypass valve control solenoid valve is operated.	
INJ ADJ VAL STAT	NO/YES/FAULTY	Injector adjustment value status is displayed. • NO: Not registered • YES: Registered • FAULTY: Data is incomplete.	
A/C RELAY	NODON/DONE	A/C relay condition is displayed. • NODON: A/C relay is OFF. • DONE: A/C relay is ON.	
CLUTCH STATUS*	NO/YES	Clutch condition is displayed • NO: Clutch pedal is not depressed after ignition switch turns ON. • YES: Clutch pedal is depressed 1 time or more after ignition switch turns ON.	
NATS CODE RGST	NO/YES	NATS code registration condition is displayed. • NO: Not registered. • YES: Registered.	

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

Monitor item	Unit	Condition	Specification
CKP CMP SYNCHRO	NODON/DONE	Crankshaft position sensor and camshaft position sensor synchronization is displayed. • NODON: Not synchronized • DONE: Synchronized	
GLOW CONT SIGNAL	ABSENT/PRESENT	Glow control signal is displayed. • ABSENT: Glow control is OFF. • PRESENT: Glow control is ON.	
CPP SW	INACT/ACTIV	Clutch pedal condition is displayed. • INACT: Clutch pedal is released. • ACTIV: Clutch pedal is depressed.	
BPP SW	INACT/ACTIV	Brake pedal condition is displayed. • INACT: Brake pedal is released. • ACTIV: Brake pedal is depressed.	
VHCL SPEED MTR	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
COOLING FAN MOT	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
ENG SPEED	rpm	Engine speed computed from crankshaft position sensor is displayed.	
ECT SEN VOLT	V	Engine coolant temperature sensor signal voltage is displayed.	
IAT SEN VOLT	V	Intake air temperature sensor signal voltage is displayed.	
FUEL TEMP/S VOLT	V	Fuel temperature sensor signal voltage is displayed.	
BARO SEN VOLT	V	Barometric pressure sensor signal voltage is displayed.	
RFRG PRE/S VOLT	V	Refrigerant pressure sensor signal voltage is displayed.	
MAF SEN VOLT	V	Mass air flow sensor signal voltage is displayed.	
EGR POS/S VOLT	V	EGR volume control valve control position sensor signal voltage is displayed.	
BAT VOLT	V	Battery voltage is displayed.	
APP SEN1 VOLT	V	Accelerator pedal position sensor 1 signal voltage is displayed.	
APP SEN2 VOLT	V	Accelerator pedal position sensor 2 signal voltage is displayed.	
EX GAS PR/S VOLT	V	Exhaust gas pressure sensor signal voltage is displayed.	
ENG COOLAN TEMP	°C or °F	Engine coolant temperature is displayed.	
TC BOOST PRES	bar	Turbocharger boost pressure is displayed.	
FUEL RAIL PRES	bar	Fuel rail pressure is displayed.	
INJ VOLUME	mg/cp	Fuel injection volume is displayed.	
A/F SEN1 TEMP	°C or °F	Air fuel ratio (A/F) sensor element temperature is displayed.	
A/F SEN1	V	A/F signal computed from the input signal of the air fuel ratio (A/F) sensor is displayed.	

*: The item is indicated, but not used.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

NOTE:

- DTC P1001 indicated after the Active Test. This is not malfunction.
- DTC P1001 is erased after the ignition switch is turned OFF.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[V9X]

Test item	Condition	Judgment	Check item (Remedy)
TC BST CONT S/V	- Ignition switch: ON - Turn turbocharger boost control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	Turbocharger boost control solenoid valve makes an operating sound.	- Harness and connector - Turbocharger boost control valve
FRP CONTROL VALVE	- Ignition switch: ON - Turn fuel rail pressure regulation actuator ON and OFF with the CONSULT-III and listen to operation sound.	Fuel rail pressure regulation actuator makes an operating sound.	- Harness and connector - Fuel rail pressure control valve
GLOW CONTROL UNIT	- Ignition switch: ON (Engine stopped) - Turn the glow control unit ON and OFF using CONSULT-III and check voltage between glow plug terminals and ground.	Battery voltage should exist to glow plug when glow control unit is ON.	- Harness and connector - Glow control unit
EGR COOLER BY-PASS CONT S/V	- Ignition switch: ON - Turn EGR cooler bypass valve control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	EGR cooler bypass valve control solenoid valve makes an operating sound.	- Harness and connector - EGR cooler bypass valve control solenoid valve
THROTTLE VALVE	- Ignition switch: ON - Turn throttle control motor ON and OFF with the CONSULT-III and confirm the operation.	Throttle valve is operated.	- Harness and connector - Electric throttle control actuator
FUEL PUMP	- Ignition switch: ON - Turn fuel flow actuator ON and OFF with the CONSULT-III and listen to operation sound.	Fuel flow actuator makes an operating sound.	- Harness and connector - Fuel pump
TURBOCHARGER COOLING PUMP	- Ignition switch: ON - Turn turbocharger cooling pump ON and OFF with the CONSULT-III and listen to operation sound.	Turbocharger cooling pump makes an operating sound.	- Harness and connector - Turbocharger cooling pump
ENGINE MOUNTING	- Ignition switch: ON - Turn electronic controlled engine mount control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	electronic controlled engine mount control solenoid valve makes an operating sound.	- Harness and connector - electronic controlled engine mount control solenoid valve

Diagnosis Tool Function

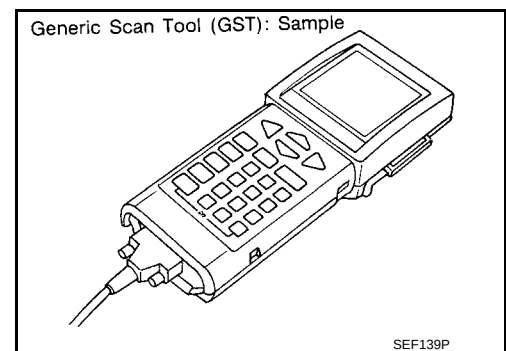
INFOID:000000006466452

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.

ISO9141 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.



FUNCTION

ON BOARD DIAGNOSTIC (OBD) SYSTEM

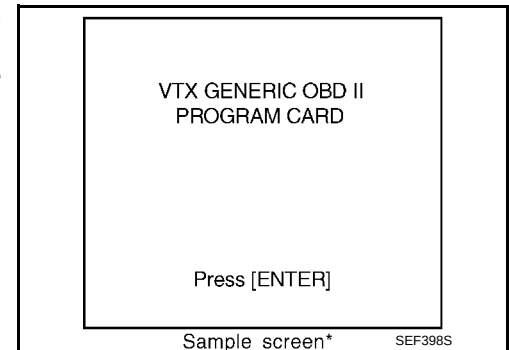
< SYSTEM DESCRIPTION >

[V9X]

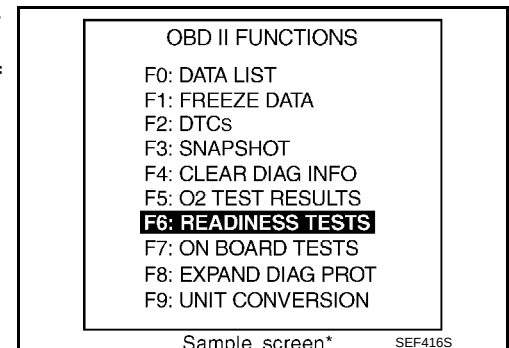
Diagnostic Service		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector.
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:000000006466453

VALUES ON THE DIAGNOSIS TOOL

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

NOTE:

The displayed data may differ from an actual signal/value/operation, as some of them are calculated by ECM, based on signals transmitted from ECM-related sensors to ECM.

Monitor item	condition		Values/Status
CRUISE CONT SW	Ignition switch: ON	ASCD MAIN switch: Released	OFF
		ASCD MAIN switch: Pressed	ON
SPEED LIMITER SW	Ignition switch: ON	Speed limiter MAIN switch: Released	OFF
		Speed limiter MAIN switch: Pressed	ON
CC/SL STR SW	Steering switch is invalid voltage		INVALID
	Steering switch circuit is open circuit		OPEN
	Steering switch	Not pressed	RELEAS
		CANCEL switch: Pressed	CANCEL
		SET / – switch: Pressed	SET/–
		RES / + switch: Pressed	RES/+
		RES switch: Pressed	RESUM
TC COOL W/P STAT	After 3 minutes from turn ignition switch is OFF	Engine coolant temperature: Less than 94.5°C (202°F)	ON
		Engine coolant temperature: 94.5°C (202°F) or more	OFF
EGR C/P STATUS	Engine Running	EGR cooling water pump: Not operating	OFF
		EGR cooling water pump: Operating	ON
EGR COOL BYPAS/V	Engine Running	Not warm-up condition	INACT
		Warm-up condition	ACTIV
INJ ADJ VAL STAT	Ignition switch: ON	Injector adjustment value registration: Not registered	NO
		Injector adjustment value registration: Registered	YES
		Injector adjustment value registration: Data is incomplete	FAULTY
A/C RELAY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	NODON
		Air conditioner switch: ON	DONE
CLUTCH STATUS*	Ignition switch: ON	Clutch pedal is not depressed	NO
		Clutch pedal is depressed 1 time or more	YES
NATS CODE RGST	Ignition switch: ON	NATS code registration: Not registered.	NO
		NATS code registration: Registered.	YES
CKP CMP SYNCHRO	Ignition switch: ON (Engine stopped)		NODON
	Engine Running		DONE
GLOW CONT SIGNAL	Engine: Running (Less than 60 seconds after starting engine.)	Engine coolant: Less than 20°C (68°F)	PRESENT
		Engine coolant: More than 80°C (176°F)	ABSENT

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Monitor item	condition		Values/Status
CPP SW	Ignition switch: ON	Clutch pedal: Fully released	INACT
		Clutch pedal: Slightly depressed	ACTIV
BPP SW	Ignition switch: ON	Brake pedal: Fully released	RELSD
		Brake pedal: Slightly depressed	PRSSD
VHCL SPEED MTR	Turn drive wheels and compare CONSULT-III value with the speed meter indication.		Almost the same speed as the speedometer indication
COOLING FAN MOT	Engine: Running		0 - 100%
ENG SPEED	Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
ECT SEN VOLT	Engine Running		Output voltage varies with engine coolant temperature.
IAT SEN VOLT	Engine Running		Output voltage varies with intake air temperature.
FUEL TEMP/S VOLT	Engine Running		Output voltage varies with fuel temperature.
BARO SEN VOLT	Engine Running		Output voltage varies with atmospheric.
RFRG PRE/S VOLT	- Engine: After warming up - Both A/C switch and blower fan switch: ON (Compressor operates)		Approx. 1.8 V
MAF SEN VOLT	- Engine: After warming up - Air conditioner switch: OFF - Shift lever: P or N - No load	Ignition switch: ON (Engine stopped)	Approx. 0.4 V
		Idle speed	1.0 - 1.5 V
		Engine is revving from idle to about 4,000 rpm	1.0 - 1.5 V to 2.4 V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.)
EGR POS/S VOLT	Engine idle		Approx. 3.0 V
BAT VOLT	Ignition switch: ON		Approx. 11 - 14 V
APP SEN1 VOLT	Ignition switch: ON	Accelerator pedal: Fully released	Approx. 0.7 V
		Accelerator pedal: Fully depressed	Approx. 4.5 V
APP SEN2 VOLT	Ignition switch: ON	Accelerator pedal: Fully released	Approx. 0.3 V
		Accelerator pedal: Fully depressed	Approx. 2.2 V
EX GAS PR/S VOLT	Engine Running	Idle speed	Approx. 0.8 V
		Engine speed: 2,000 rpm	Approx. 1.0 V
ENG COOLAN TEMP	Ignition switch: ON		Indicates engine coolant temperature
TC BOOST PRES	- Engine: After warming up - Shift lever: P or N - No load	Idle speed	Approx. Atmospheric pressure
		Engine speed: 2,000 rpm	Approx. 1.100 - 1.500 bar
FUEL RAIL PRES	- Engine: After warming up - Shift lever: P or N - No load	Idle speed	Approx. 300 - 350 bar
		Engine speed: 2,000 rpm	Approx. 500 - 550 bar
INJ VOLUME	- Engine: After warming up - Shift lever: P or N - No load	Idle speed	Approx. 6.0 - 8.5 mg/cp
		Engine speed: 2,000 rpm	Approx. 6.0 - 8.5 mg/cp

ECM

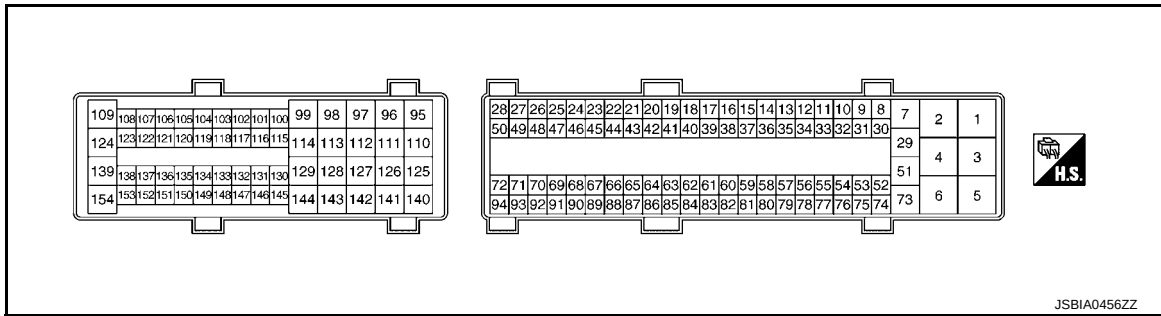
[V9X]

< ECU DIAGNOSIS INFORMATION >

Monitor item	condition	Values/Status
A/F SEN1 TEMP	- Engine speed: Idle after the following condition are met. - Engine: After warming up - Keeping the engine speed about 3,000 rpm for 3 minutes and at idle for 1 minutes under no load	Approx. 780°C
A/F SEN1	- Engine: After warming up - Shift lever: P or N - No load Engine speed: 2,000 rpm	Approx. 1.80 V

*: This item is displayed but is not applicable to this model.

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
1 (B)	—	ECM ground	—	—	—
2 (B)	—	ECM ground	—	—	—
3 (R)	1 (B)	Power supply for ECM	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4 (B)	—	ECM ground	—	—	—
5 (G)	1 (B)	Power supply for ECM	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
6 (G)	1 (B)	Power supply for ECM	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
7 (R)	1 (B)	Turbocharger cooling water pump	Output	Turbocharger cooling water pump operate.	0 V
				Turbocharger cooling water pump not operate.	BATTERY VOLTAGE (11 - 14 V)
10 (GR)	—	Sensor ground (Air fuel ratio sensor 1)	—	—	—
11 (O)	10 (GR)	Air fuel ratio sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	0.5 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.5 V

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< ECU DIAGNOSIS INFORMATION >

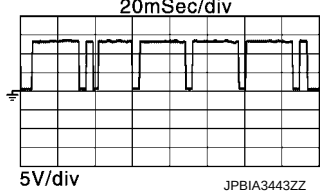
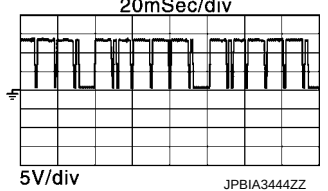
[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)	
+	—	Signal name	Input/ Output			
12 (B)	1 (B)	Speed limiter MAIN switch	Input	[Ignition switch: ON] Speed limiter MAIN switch: OFF	0 V	EC
				[Ignition switch: ON] Speed limiter MAIN switch: Pressed	BATTERY VOLTAGE (11 - 14 V)	
14 (B)	—	Glow control unit ground	—	—	—	C
17 (O)	—	Sensor ground (Turbocharger boost sensor)	—	—	—	D
18 (L)	1 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V	E
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
19 (R)	21 (L)	Sensor power supply (Mass air flow sensor)	—	[Ignition switch: ON]	5 V	F
21 (L)	—	Sensor ground (Mass air flow sensor/In- take air temperature sensor)	—	—	—	G
23 (L)	—	Sensor ground (Fan speed sensor)	—	—	—	H
24 (P)	23 (L)	Sensor power supply (Fan speed sensor)	—	[Ignition switch: ON]	5 V	I
29 (R)	1 (B)	EGR cooling water pump	Output	[Engine is running] • Warm-up condition • Idle speed	0 V	J
32 (SB)	10 (GR)	Air fuel ratio sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	1.9 V	K
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.0 V	
33 (V)	10 (GR)	Air fuel ratio sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	1.9 V	L
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.0 V	
35 (P)	—	CAN-L	—	—	—	N
36 (L)	—	CAN-H	—	—	—	O
39 (LG)	17 (O)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.3 V	P
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.4 V	
40 (GR)	150 (W)	Sensor power supply (EGR volume control valve position sensor)	—	[Ignition switch: ON]	5 V	

ECM

< ECU DIAGNOSIS INFORMATION >

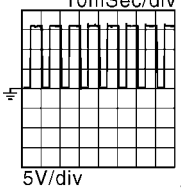
[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
43 (Y)	21 (L)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.2 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.7 V
44 (B)	21 (L)	Intake air temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.0 V Output voltage varies with intake air temperature.
45 (B)	—	Sensor ground (Camshaft position sensor)	—	—	—
46 (Y)	45 (B)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
47 (G)	1 (B)	Fuel heater relay	Output	Fuel heater operate.	0 V
				Fuel heater not operate.	BATTERY VOLTAGE (11 - 14 V)
49 (W)	1 (B)	ECM relay (Self shut-off)	Output	[Ignition switch: ON]	0 - 1 V
				[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF	
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	BATTERY VOLTAGE (11-14 V)
50 (R)	14 (B)	Glow control	Output	[Engine is running] • Idle speed • Engine coolant temperature: Less than 20 °C (68 °F)	8.8 V
				[Engine is running] • Idle speed • Engine coolant temperature: More than 80 °C (176 °F)	BATTERY VOLTAGE (11-14 V)

ECM

< ECU DIAGNOSIS INFORMATION >

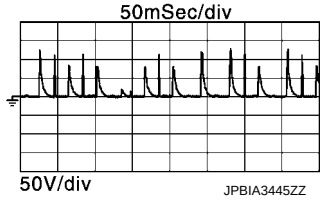
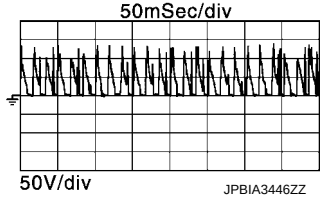
[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
51 (P)	10 (GR)	Air fuel ratio sensor heater	Output	[Engine is running] After the vehicle is driven for 6 minutes under the following conditions • Warm-up condition • Vehicle speed: 80 km/h • Shift lever: Suitable gear position	6 - 14 V★ 
				[Ignition switch ON] Engine: Stopped	BATTERY VOLTAGE (11-14 V)
54 (R)	77 (B)	Sensor power supply (G sensor)	—	[Ignition switch: ON]	5 V
57 (W)	79 (Y)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.7 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.5 V
58 (V)	80 (P)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.2 V
59 (L)	80 (P)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
64 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
67 (V)	23 (L)	Cooling fan speed	Input	[Ignition switch: ON] • Engine: Stopped	Approximately 5.0V
				[Engine is running] • Idle speed • No load • Selector lever: P or N position • A/C switch: OFF • Water temp: Less than 98°C	3.3 Hz - 5.0 Hz
				[Engine is running] • Idle speed • No load • Selector lever: P or N position • A/C switch: OFF • Water temp: 98°C or more	13.7 Hz - 15.4 Hz One minute or more after water temperature reaches 98°C or more.
72 (SB)	1 (B)	K-LINE	Input/ Output	[Ignition switch: ON] GST: Disconnected	5 V - BATTERY VOLTAGE (11-14 V)
74 (GR)	14 (B)	Glow plug diagnostic	Input	[Engine is running] • Idle speed • Engine coolant temperature: More than 80 °C (176 °F)	5.4 V
76 (W)	77 (B)	G sensor	Input	[Ignition switch: ON]	4.8 V
77 (B)	—	Sensor ground (G sensor)	—	—	—

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
79 (Y)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
80 (P)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
81 (G)	79 (Y)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
86 (W)	1 (B)	Brake switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	0V
				[Ignition switch: ON] Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
87 (SB)	64 (B)	ASCD steering switch	Input	[Ignition switch: ON] ASCD steering switch: OFF	3.6 - 4.4 V
				[Ignition switch: ON] CANCEL switch: Pressed	0.6 - 1.4 V
				[Ignition switch: ON] RES / + switch: Pressed	2.6 - 3.2 V
				[Ignition switch: ON] SET / - switch: Pressed	1.6 - 2.3 V
90 (BR)	1 (B)	ASCD MAIN switch	Input	[Ignition switch: ON] ASCD MAIN switch: OFF	0 V
				[Ignition switch: ON] ASCD MAIN switch: ON	BATTERY VOLTAGE (11 - 14 V)
95 (W)	1 (B)	Fuel injector No.1	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
96 (G)	1 (B)	Fuel injector No.3	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
97 (B)	1 (B)	Fuel injector No.5	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
98 (BR)	1 (B)	Fuel Flow actuator	Input	[Engine is running] • Warm-up condition • Idle speed	9.4 V
99 (B)	1 (B)	Fuel rail pressure regulation actuator	Output	[Engine is running] • Warm-up condition • Idle speed	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
100 (G)	—	Sensor ground (Engine oil temperature sensor)	—	—	—

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< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
101 (V)	102 (W)	Fuel temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.9 V Output voltage varies with fuel temperature.
102 (W)	—	Sensor ground (Fuel temperature sensor)	—	—	—
104 (R)	—	Sensor ground (Throttle position sensor)	—	—	—
107 (Y)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
108 (L)	107 (Y)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan switch: ON (Compressor operates)	1.8 V
110 (R)	1 (B)	Fuel injector power supply No.1	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
111 (BR)	1 (B)	Fuel injector power supply No.3	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
112 (G)	1 (B)	Fuel injector power supply No.5	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
113 (SB)	1 (B)	EGR cooler bypass valve control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 V - 14 V)
114 (L)	1 (B)	Turbocharger boost control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	3.4 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	6.0 V
115 (W)	100 (G)	Engine oil temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	3.5 V
120 (L)	132 (Y)	Sensor power supply (Exhaust gas pressure sensor 1)	—	[Ignition switch: ON]	5 V
121 (Y)	104 (R)	Throttle position sensor	Input	[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF	0 - 5 V Output voltage fluctuates between 0 V and 5 V.
				[Ignition switch: OFF] More than 20 seconds after turning ig- nition switch OFF NOTE: Repeat several times opening and shutting after turning ignition switch OFF.	0.7 V
123 (G)	107 (Y)	Sensor power supply (Refrigerant pressure sen- sor)	—	[Ignition switch: ON]	5 V

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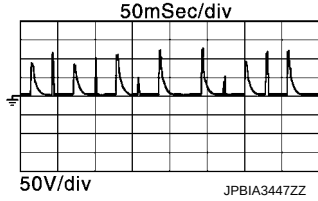
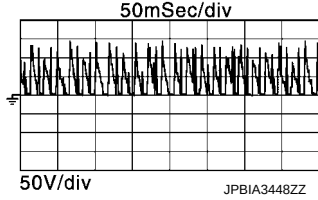
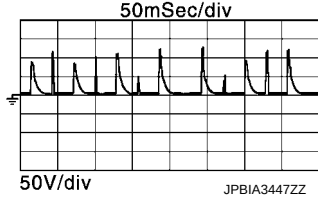
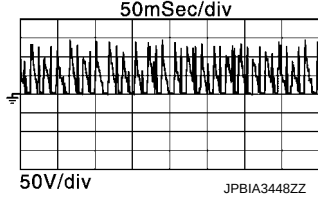
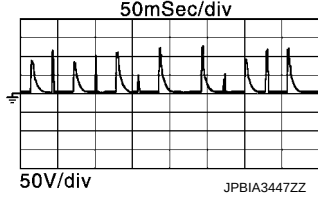
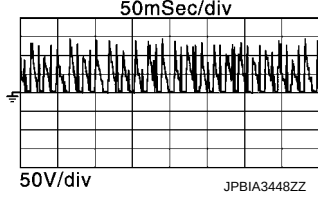
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< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
125 (G)	1 (B)	Fuel injector power supply No.6	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 50mSec/div 50V/div JPBIA3447ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 50mSec/div 50V/div JPBIA3448ZZ
126 (R)	1 (B)	Fuel injector power supply No.2	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 50mSec/div 50V/div JPBIA3447ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 50mSec/div 50V/div JPBIA3448ZZ
127 (G)	1 (B)	Fuel injector power supply No.4	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	 50mSec/div 50V/div JPBIA3447ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	 50mSec/div 50V/div JPBIA3448ZZ

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
128 (LG)	1 (B)	Throttle control motor (+)	Output	[Engine is running] • Warm-up condition • Idle speed	
				[Ignition switch: OFF] For 20 seconds after turning ignition switch OFF	
				[Ignition switch: OFF] More than 20 seconds after turning ignition switch OFF	0.1 V
129 (SB)	1 (B)	Throttle control motor (—)	—	[Engine is running] • Warm-up condition • Idle speed	0 V
130 (O)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
131 (R)	132 (Y)	Exhaust gas pressure sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	0.8 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.0 V
132 (Y)	—	Sensor ground (Exhaust gas pressure sensor 1)	—	—	—
133 (G)	149 (Y)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5 V
134 (L)	149 (Y)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.6 V
135 (BR)	150 (W)	EGR volume control valve position sensor	Input	[Engine is running] • Warm-up condition • Idle speed	3.0 V

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< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
137 (Y)	1 (B)	Crankshaft position sensor (-)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
138 (B)	1 (B)	Electronic controlled engine mount solenoid valve	Output	Electronic controlled engine mount operate.	0 V
				Electronic controlled engine mount not operate.	BATTERY VOLTAGE (11 V - 14 V)
140 (B)	1 (B)	Fuel injector No.6	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
141 (G)	1 (B)	Fuel injector No.2	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
142 (B)	1 (B)	Fuel injector No.4	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	
143 (R)	1 (B)	EGR volume control valve (DC motor -)	Output	[Ignition switch: OFF] For 20 seconds after the following conditions are met and ignition switch is turned OFF. • Warm-up condition • Start engine and let it idle for 3 minutes.	
				[Engine is running] • Warm-up condition • Idle speed NOTE: The duty cycle changes depending on EGR volume control valve operation.	

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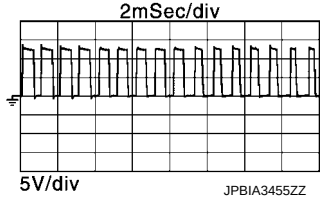
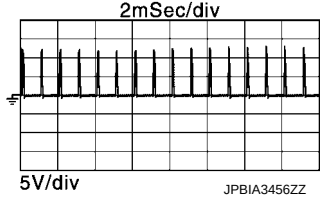
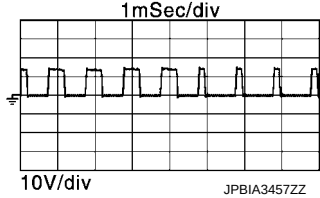
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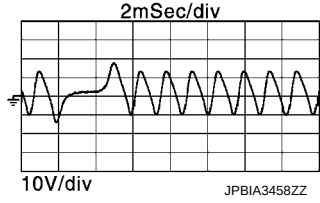
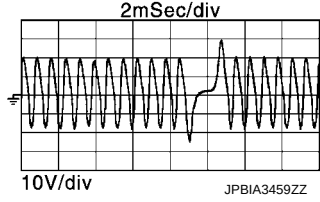
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
144 (L)	1 (B)	EGR volume control valve (DC motor +)	Output	[Ignition switch: ON] For 3 seconds after ignition switch is turned ON	
				[Ignition switch: ON] More than 3 seconds after ignition switch is turned ON	
				[Engine is running] • Warm-up condition • Idle speed NOTE: The duty cycle changes depending on EGR volume control valve opera- tion.	
145 (P)	130 (O)	Engine coolant tempera- ture sensor	Input	[Engine is running] Idle speed	0.7 - 2.5 V Output voltage varies with engine coolant temperature.
146 (L)	147 (Y)	Exhaust gas temperature sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	4.9 V Output voltage varies with exhaust gas temperature.
147 (Y)	—	Sensor ground (Exhaust gas temperature sensor 1)	—	—	—
148 (BR)	104 (R)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
149 (Y)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
150 (W)	—	Sensor ground (EGR volume control valve position sensor)	—	—	—
151 (BR)	17 (O)	Sensor power supply (Turbocharger boost sen- sor)	—	[Ignition switch: ON]	5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
152 (L)	1 (B)	Crankshaft position sensor (+)	—	[Engine is running] • Warm-up condition • Idle speed	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Fail Safe

INFOID:000000006466454

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0045	Turbocharger boost control solenoid valve circuit	• ECM stops the EGR volume control valve (fully closed position). • ECM shuts the EGR cooler bypass valve. • ECM stops the turbocharger control. • ECM limits the amount control of fuel injected.
P0089 P0090	Fuel flow actuator circuit	• ECM limits the amount control of fuel injected. • ECM stops the EGR control. • Fuel flow actuator open loop mode. • ECM shuts the fuel flow actuator. (Fuel flow actuator circuit is short circuit to ground.)
P0100	Mass air flow sensor circuit	• ECM stops the EGR volume control valve (fully closed position). • ECM operates the EGR cooler bypass valve.
P0110	Intake air temperature sensor	• ECM stops the EGR volume control valve (fully closed position). • ECM operates the EGR cooler bypass valve. • ECM prohibits the EGR volume control valve closed position learning.
P0115	Engine coolant temperature sensor circuit	• ECM stops the EGR volume control valve (fully closed position). • ECM shuts the EGR cooler bypass valve. • ECM operates cooling fan at the maximum speed. • ECM operates the turbocharger cooling water pump.
P0120	Throttle position sensor circuit	ECM stops the electric throttle valve control.
P012B	High pressure air circuit	• ECM limits the torque. • ECM stops the EGR volume control valve (fully closed position). • ECM shuts the EGR cooler bypass valve. • ECM stops the turbocharger control.
P0180	Fuel temperature sensor circuit	ECM considers fuel temperature to be engine coolant temperature.
P0190	FRP sensor circuit	ECM limits the amount control of fuel injected.
P0195	Engine oil temperature sensor circuit	ECM considers engine oil temperature to be 135°C (275°F).
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	ECM stops the EGR control.

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0225 P2120	Accelerator pedal position sensor	- ECM prohibits the operation of the ASCD system. - ECM prohibits the operation of the A/C compressor. - ECM limits the torque.
P0235	Turbocharger boost pressure sensor circuit	- ECM limits the torque. - ECM considers boost pressure to be 750 hpa. - ECM prohibits the turbocharger boost control.
P0409	EGR valve position sensor circuit	- ECM stops the EGR volume control valve (fully closed position). - ECM operates the EGR cooler bypass valve.
P0470	Exhaust gas pressure sensor 1 circuit	- ECM limits the torque. - ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve. - ECM stops the turbocharger control.
P0487	EGR valve	ECM stops the EGR volume control valve (fully closed position).
P0488	EGR system	- ECM limits the amount control of fuel injected. - ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve. - ECM prohibits the EGR volume control valve closed position learning. - ECM stops the turbocharger control.
P0500	Vehicle speed sensor	- ECM prohibits the operation of the A/C compressor. - ECM considers vehicle speed to be 25 km/h (15.5 MPH).
P0525 P1525	ASCD system	ECM prohibits the operation of the ASCD system.
P0530	Refrigerant pressure sensor	- ECM operates the cooling fan at the low speed. - ECM prohibits the operation of the A/C compressor.
P0544 P2080	Exhaust gas temperature sensor 1	- ECM limits the torque. - ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve.
P0560	Battery voltage	When battery voltage is 6 V or less, power supply of ECM becomes OFF.
P0564 P0575	ASCD steering switch	ECM prohibits the operation of the ASCD system.
P0571	Brake pedal position switch circuit	ECM cancels the operation of the ASCD system.
P0574	ASCD speed sensor	ECM prohibits the operation of the ASCD system.
P0606 P060B P060C P0611 P062F P1609	ECM	- ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve.
P0641 P0651 P0697	Sensors supply	- ECM limits the torque. - ECM prohibits the operation of the ASCD system. - ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve. - ECM stops the turbocharger control. - ECM prohibits the operation of the A/C compressor.
P2101	Electric throttle control	ECM stops the EGR control.
P2146 P2149	Fuel injector power supply circuit	ECM stops the engine promptly.
P2226	BARO sensor	- ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve. - ECM considers atmospheric pressure to be 750 hPa.
P2263	Turbocharger system	- ECM limits the torque. - ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve. - ECM stops the turbocharger control.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2293	Fuel rail pressure regulation actuator	- ECM limits the amount control of fuel injected. - ECM stops the engine promptly. - ECM stops the EGR control.
P2294	Fuel rail pressure regulation actuator circuit	- ECM limits the amount control of fuel injected. - ECM stops the EGR control.
P2299	Accelerator pedal/Brake pedal position circuit	ECM considers accelerator pedal to be fully closed position.
P2425 P2457	EGR cooling water pump	- ECM stops the EGR volume control valve (fully closed position). - ECM shuts the EGR cooler bypass valve.

DTC Inspection Priority Chart

INFOID:000000006466455

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	DTC	Detected item
1	U1000, U1001, P246E	CAN communication line
	P0016	Crankshaft position - camshaft position correlation
	P0100	Mass air flow sensor
	P0110	Intake air temperature sensor
	P0115	Engine coolant temperature sensor
	P0120	Throttle position sensor
	P0130, P0131, P0132, P0133, P0134, P2231	Air fuel ratio (A/F) sensor 1
	P0135	Air fuel ratio (A/F) sensor 1 heater
	P0180	Fuel temperature sensor
	P0190	Fuel rail pressure sensor
	P0195	Engine oil temperature sensor
	P0225, P2120	Accelerator pedal position sensor
	P0235	Turbocharger boost sensor
	P0335	Crankshaft position sensor
	P0340	Camshaft position sensor
	P0409	EGR volume control valve control position sensor
	P0470	Exhaust gas pressure sensor 1
	P0500, P0574	Vehicle speed sensor
	P0527	Electrically-controlled cooling fan coupling
	P0530	Refrigerant pressure sensor
	P0544	Exhaust gas temperature sensor 1
	P0560	Battery voltage
	P0606, P060B, P060C, P062B, P062F, P1607, P1609, P1616	ECM
	P0611	Injector adjustment value
	P0641, P0651, P0697	Sensor power supply
	P1610, P1611, P1612, P1614, P1615	NATS
	P2146, P2149	Fuel injector power supply
	P2226	Barometric pressure sensor
	P2299	Accelerator/brake pedal position inconsistency
	P2505	ECM power supply

ECM

< ECU DIAGNOSIS INFORMATION >

[V9X]

Priority	DTC	Detected item
2	P0045	Turbocharger boost control solenoid valve
	P0089, P0090	Fuel pump (Fuel flow actuator)
	P0200, P0201, P0202, P0203, P0204, P0205, P0206, P1201, P1202, P1203, P1204, P1205, P1206	Fuel injector
	P0380	Glow relay
	P0487	EGR volume control valve
	P0571	ASCD brake switch
	P0670	Glow control unit
	P0671, P0672, P0673, P0674, P0675, P0676	Glow plug
	P0685	ECM relay
	P0705, P0710, P0717, P0720, P0729, P0730, P0731, P0732, P0733, P0734, P0735, P0740, P0744, P0745, P0750, P0775, P0780, P0795, P1730, P1734, P253F, P2713, P2722, P2731, P2807	A/T related sensors, solenoid valves and switches
	P2100	Throttle control motor
	P2294	Fuel rail pressure regulation actuator
	P2425, P2457	EGR cooling water pump
	P245A	EGR cooler bypass valve control solenoid valve
	P2600	Turbocharger cooling water pump
3	P012B	High pressure air circuit
	P0488	EGR system
	P0525, P1525	ASCD system
	P0564, P0575	ASCD steering switch
	P2101	Electric throttle control function
	P2263	Turbocharger system
	P2293	FRP control system
	P2457	EGR cooling water pump
	P253F	Engine oil deteriorated

DTC Index

INFOID:000000006466456

X: Applicable —: Not applicable

DTC*	Items (CONSULT-III screen terms)	MI	Reference page
U1000	CAN CAMM CIRCUIT	—	EC-1329
U1001	CAN COMM CIRCUIT	—	EC-1330
P0016	CMP/CKP RELATION	—	EC-1331
P0045	TC BOOST SOL/V	×	EC-1336
P0089	FUEL PUMP	×	EC-1339
P0090	FUEL PUMP	×	EC-1342
P0100	MAF SENSOR	×	EC-1345
P0110	IAT SENSOR	×	EC-1349
P0115	ECT SENSOR	×	EC-1352
P0120	TP SENSOR	×	EC-1355
P012B	HIGH PRESSURE AIR CIRCUIT FAILURE	×	EC-1358
P0130	A/F SENSOR1	×	EC-1360
P0131	A/F SENSOR1	×	EC-1363

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< ECU DIAGNOSIS INFORMATION >

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DTC*	Items (CONSULT-III screen terms)	MI	Reference page
P0133	A/F SENSOR1	×	EC-1366
P0134	A/F SENSOR1	×	EC-1369
P0135	A/F SEN1 HTR	×	EC-1372
P0180	FUEL TEMP SENSOR	—	EC-1375
P0190	FRP SENSOR	×	EC-1378
P0195	EOT SENSOR	×	EC-1381
P0200	INJECTOR	×	EC-1384
P0201	CYL 1 INJECTOR	×	EC-1384
P0202	CYL 2 INJECTOR	×	EC-1384
P0203	CYL 3 INJECTOR	×	EC-1384
P0204	CYL 4 INJECTOR	×	EC-1384
P0205	CYLINDER 5 INJECTOR	×	EC-1384
P0206	CYLINDER 6 INJECTOR	×	EC-1384
P0225	APP SENSOR 1	×	EC-1387
P0235	TC BOOST SENSOR	×	EC-1390
P0335	CKP SENSOR	×	EC-1394
P0340	CMP SENSOR	×	EC-1397
P0380	GLOW RELAY	—	EC-1400
P0409	EGR POS SENSOR	×	EC-1403
P0470	EXH GAS PRESS SEN	×	EC-1406
P0487	EGR CONT VALVE	×	EC-1410
P0488	EGR SYSTEM	×	EC-1412
P0500	VEHICLE SPEED	×	EC-1415
P0525	ASCD FUNCTION	—	EC-1416
P0527	COOLING FAN SPD SEN	—	EC-1418
P0530	REFRGRT PRESS SEN	—	EC-1421
P0544	EGT SENSOR 1	×	EC-1424
P0560	BATTERY VOLTAGE	—	EC-1427
P0564	ASCD SW	—	EC-1429
P0571	BPP SW	—	EC-1433
P0574	VEHICLE SPEED	—	EC-1435
P0575	ASCD SW	—	EC-1436
P0606	ECM	× or —	EC-1440
P060B	ECM	×	EC-1441
P060C	MAIN PROCESSOR	×	EC-1442
P0611	INJ ADJ VAL	×	EC-1443
P062B	ECM	× or —	EC-1444
P062F	ECM	×	EC-1445
P0641	SENSOR PWR/CIRC1	×	EC-1446
P0651	SENSOR PWR/CIRC2	×	EC-1448
P0670	GLOW CONT SYSTEM	—	EC-1450
P0671	CYLINDER 1 GLOW PLUG	—	EC-1453
P0672	CYLINDER 2 GLOW PLUG	—	EC-1453
P0673	CYLINDER 3 GLOW PLUG	—	EC-1453

DTC*	Items (CONSULT-III screen terms)	MI	Reference page
P0674	CYLINDER 4 GLOW PLUG	—	EC-1453
P0675	CYLINDER 5 GLOW PLUG	—	EC-1453
P0676	CYLINDER 6 GLOW PLUG	—	EC-1453
P0685	ECM RELAY	×	EC-1455
P0697	SENSOR PWR/CIRC3	×	EC-1459
P0705	T/M RANGE SENSOR A	×	EC-1459 (5AT) AT-446 (7AT)
P0710	FLUID TEMP SENSOR A	×	AT-447
P0717	INPUT SPEED SENSOR A	×	AT-121 (5AT) AT-449 (7AT)
P0720	OUTPUT SPEED SENSOR	×	AT-123 (5AT) AT-450 (7AT)
P0729	6GR INCORRECT RATIO	×	AT-454
P0730	INCORRECT GR RATIO	×	AT-456
P0731	1GR INCORRECT RATIO	×	AT-130 (5AT) AT-458 (7AT)
P0732	2GR INCORRECT RATIO	×	AT-133 (5AT) AT-460 (7AT)
P0733	3GR INCORRECT RATIO	×	AT-136 (5AT) AT-462 (7AT)
P0734	4GR INCORRECT RATIO	×	AT-139 (5AT) AT-464 (7AT)
P0735	5GR INCORRECT RATIO	×	AT-142 (5AT) AT-466 (7AT)
P0740	TORQUE CONVERTER	×	AT-145 (5AT) AT-468 (7AT)
P0744	TORQUE CONVERTER	×	AT-147 (5AT) AT-469 (7AT)
P0745	PC SOLENOID A	×	AT-149 (5AT) AT-470 (7AT)
P0750	SHIFT SOLENOID A	×	AT-471
P0775	PC SOLENOID B	×	AT-472

ECM

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[V9X]

DTC*	Items (CONSULT-III screen terms)	MI	Reference page
P0780	SHIFT	×	AT-473
P0795	PC SOLENOID C	×	AT-475
P1001	MNTRTOOL FNCTN	—	EC-1461
P1201	CYL 1 INJECTOR	—	EC-1462
P1202	CYL 2 INJECTOR	—	EC-1462
P1203	CYL 3 INJECTOR	—	EC-1462
P1204	CYL 4 INJECTOR	—	EC-1462
P1205	CYLINDER 5 INJECTOR	—	EC-1462
P1206	CYLINDER 6 INJECTOR	—	EC-1462
P1525	ASCD FUNCTION	—	EC-1464
P1607	ECM	×	EC-1465
P1609	ECM	×	EC-1466
P1610	LOCK MODE	—	BL-74
P1611	ID DISCORD, IMMU-ECM	—	
P1612	CHAIN OF ECM-IMMU	—	
P1614	CHAIN OF IMMU-KEY	—	
P1615	DIFFERENCE OF KEY	—	EC-1467
P1616	ECM C/U	—	
P1730	INTERLOCK	—	AT-159 (5AT) AT-482 (7AT)
P1734	7GR INCORRECT RATIO	—	AT-484
P2100	ETC FUNCTION	×	EC-1468
P2101	ETC FUNCTION	×	EC-1471
P2120	APP SENSOR 2	×	EC-1473
P2146	INJ PWR/CIRC	×	EC-1476
P2149	INJ PWR/CIRC	×	EC-1476
P2226	BARO SENSOR	×	EC-1478
P2231	A/F SENSOR1	×	EC-1479
P2263	TC SYSTEM	×	EC-1481
P2293	FRP CONTROL SYSTEM	×	EC-1486
P2294	FRP CONTROL VALVE	×	EC-1488
P2299	APP/BPP INCNSSTNCY	×	EC-1490
P2425	EGR COOLER BYP/V	×	EC-1495
P2457	EGR COOLING SYSTEM	×	EC-1498
P245A	EGR COOLER BYP/V	×	EC-1501
P246E	CAN COMM CIRCUIT	—	EC-1504
P2505	ECM POWER SUPPLY	—	EC-1505
P253F	ENGINE OIL DETERIORATED	×	EC-1507
P2600	TC COOLING PUMP	—	EC-1508
P2713	PC SOLENOID D	×	AT-489
P2722	PC SOLENOID E	×	AT-490
P2731	PC SOLENOID F	×	AT-491
P2807	PC SOLENOID G	×	AT-492

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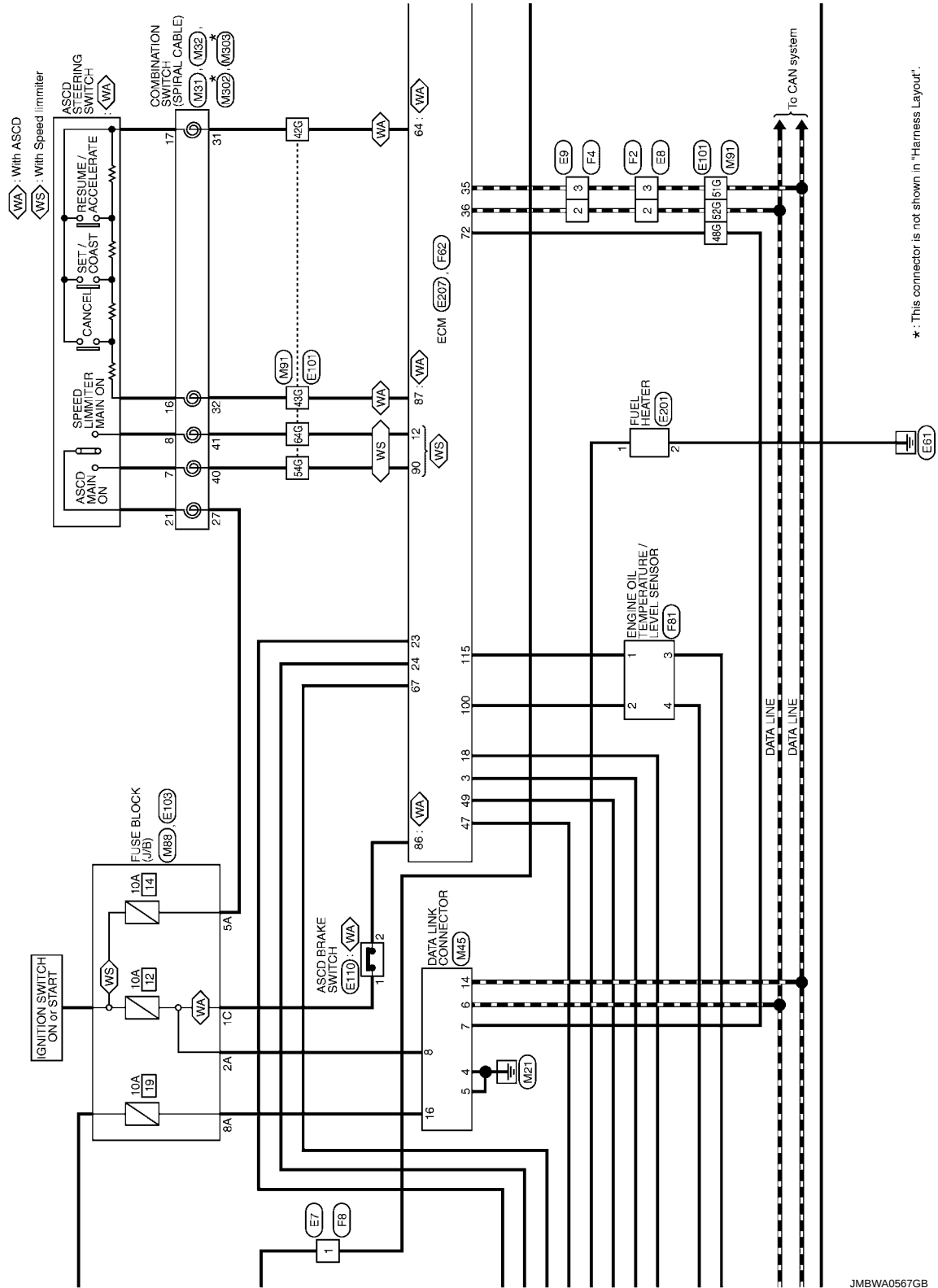
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ENGINE CONTROL SYSTEM

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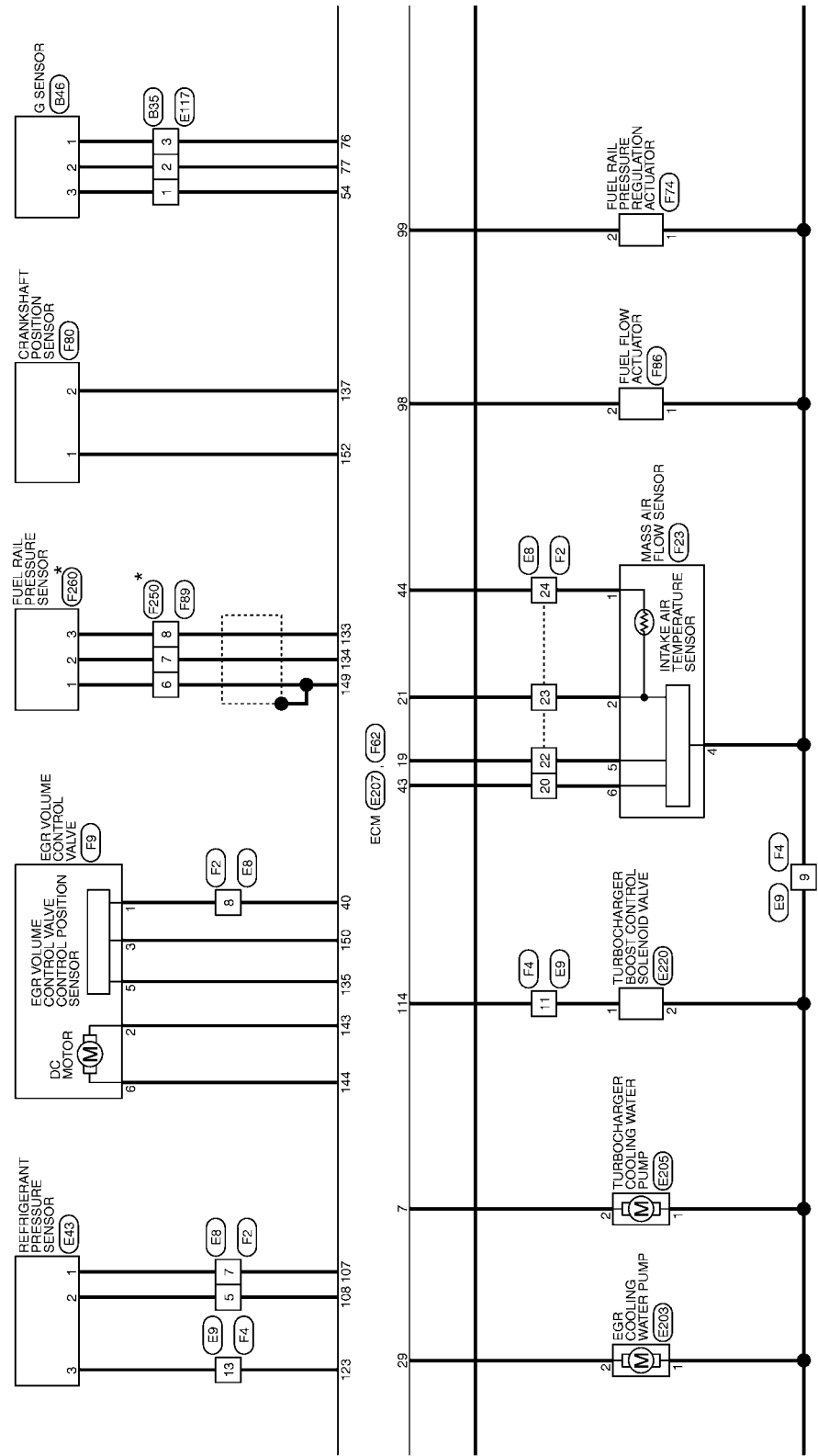
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ENGINE CONTROL SYSTEM

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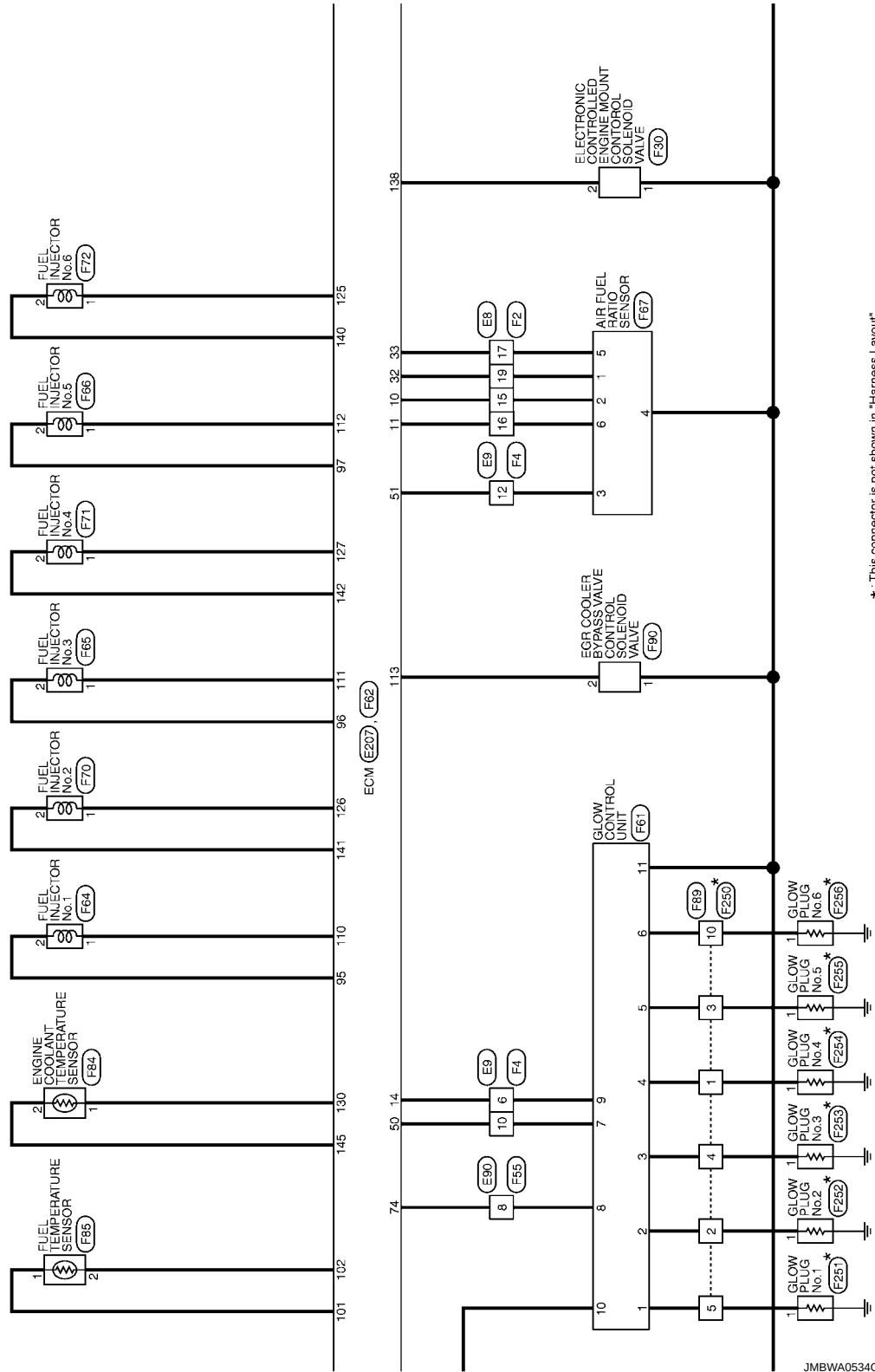
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ENGINE CONTROL SYSTEM

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ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	B35
Connector Name	WIRE TO WIRE
Connector Type	TH16FWNH



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	W	-

Connector No.	B46
Connector Name	G SENSOR
Connector Type	HS03FB-2V



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	OUTPUT
2	B	GND
3	R	POWER

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	Y01MGY



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	TH24MXNH



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	-
2	L	-
3	P	-
4	B	-
5	L	-
7	Y	-
8	GR	-
10	L	-
11	SB	-
15	GR	-
16	O	-

17	V	-
18	BR	-
19	SB	-
20	Y	-
22	R	-
23	L	-
24	B	-

Connector No.	E9
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-GS



Terminal No.	Color of Wire	Signal Name [Specification]
2	L	-
3	P	-
6	B	-
9	G	-
10	R	-
11	L	-
12	P	-
13	G	-

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-GS



Terminal No.	Color of Wire	Signal Name [Specification]
3	G	-
4	R	-
6	V	-
7	W	-
8	R	-
9	Y	-
11	Y	-
17	L	-
18	V	-

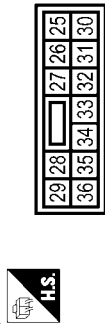
ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[V9X]

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	E13
Connector Name	IPDM/ER INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS



Terminal No.	Color of Wire	Signal Name [Specification]
30	V	-

Connector No.	E17
Connector Name	IPDM/ER INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW



Terminal No.	Color of Wire	Signal Name [Specification]
38	B	-
39	L	-
40	P	-
47	G	-

Connector No.	E18
Connector Name	IPDM/ER INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	MD6FBL-C



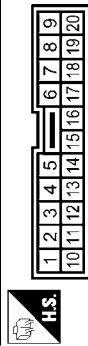
Terminal No.	Color of Wire	Signal Name [Specification]
59	B	-

Connector No.	E43
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



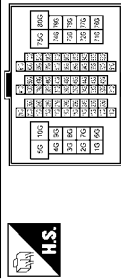
Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	WEIGHT
2	L	SIGNAL
3	G	SUPPLY

Connector No.	E90
Connector Name	WIRE TO WIRE
Connector Type	TK20MW



Terminal No.	Color of Wire	Signal Name [Specification]
8	GR	-
9	V	-
19	L	-
20	P	-

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-ANS16-TM4



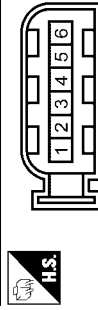
Terminal No.	Color of Wire	Signal Name [Specification]
36G	SB	-
37G	L	-
42G	B	-
43G	SB	-
48G	SB	-
51G	P	-
52G	L	-
54G	BR	-
64G	B	-

Connector No.	E103
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS08FW-CS



Terminal No.	Color of Wire	Signal Name [Specification]
1C	P	-

Connector No.	E108
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	AEV06FB-RH



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	SUPPLY AFS2
2	G	SUPPLY AFS1
3	W	AFS1
4	Y	GND AFS1
5	P	GND AFS2
6	V	AFS2

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	E110
Connector Name	ASC/D BRAKE SWITCH
Connector Type	MD2FBR-LC



1	2

Connector No.	E112
Connector Name	WIRE TO WIRE
Connector Type	NS16MGY-CS



1	2	3	4	5	6	7		
8	9	10	11	12	13	14	15	16

Connector No.	E117
Connector Name	WIRE TO WIRE
Connector Type	TH16MW-AH



1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

Connector No.	E201
Connector Name	FUEL HEATER
Connector Type	BS03FB-AHY-S



1	2

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	-
2	W	-

Terminal No.	Color of Wire	Signal Name [Specification]
10	P	-
11	L	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	W	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	(+)
2	B	GND

Connector No.	E202
Connector Name	WIRE TO WIRE
Connector Type	MD5WB-LC



1	2	3
4	5	6

Connector No.	E203
Connector Name	EGR COOLING WATER PUMP
Connector Type	AHY502FB



1	2

Connector No.	E205
Connector Name	TURBOCHARGER COOLING WATER PUMP
Connector Type	AHY502FB



1	2

Connector No.	E206
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Type	BOSCH 192840473



2	3	1

Terminal No.	Color of Wire	Signal Name [Specification]
3	G	-
4	B	-
5	Y	-
6	L	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	R	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	R	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	5V
2	LG	VS
3	O	GND

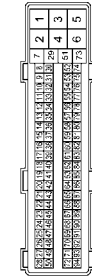
ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[V9X]

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	E207
Connector Name	ECM
Connector Type	AMP3-1534904-4



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	GND
2	B	GND
3	R	VBATT
4	B	GND
5	G	VBATT
6	G	VBATT
7	R	TURBINE COOLANT PUMP
10	GR	CAT UEGO SENS GND
11	O	CAT UEGO SENS
12	B	SPEED LIMIT
14	B	GND GLOW PULG

Connector No.	E220
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Type	BS02FB-AHY-S

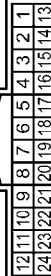


Terminal No.	Color of Wire	Signal Name [Specification]
1	O	-
2	W	-

64	B	GND CRUISE CONTROL PANEL
67	V	FFAN REV SIG
72	SB	K LINE
74	GR	GLOW PLUG DIAGNOSTIC
76	W	G SENS
77	B	GND G SENS
79	Y	GND APS1
80	P	GND APS2
81	G	AVCC APS1
86	W	AVCC APS2
87	SB	BRAKE SV MAIN
90	BR	CRUISE CONTROL PANEL SPEED CTRL

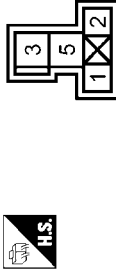
17	O	GND BOOST PRESS
18	L	IGN
19	R	AVCC AIR FLOW
21	L	GND AIR FLOW
23	L	EFAN SENS GND
24	P	EFAN SENS PWR
29	R	EGR COOLANT PUMP
32	SB	CAT UEGO SENS
33	V	CAT UEGO SENS
35	P	MAIN CAN L
36	L	MAIN CAN H
39	LG	BOOST PRESS
40	GR	AVCC EGR POSITION
43	Y	AIR FLOW
44	B	INTAKE AIR TEMP
45	B	GND CAMSHAFT SENS
46	Y	CAMSHAFT SENS
47	G	F HEATER RLY
49	W	MAIN RLY
50	R	GLOW PLUG COMMOND
51	P	CAT UEGO SENS HEATER
54	R	AVCC2 G SENS
57	W	APS1
58	V	APS2
59	L	AVCC APS2

17	V	-
18	BR	-
19	SB	-
20	Y	-
22	R	-
23	L	-
24	B	-



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	-
2	L	-
3	P	-
4	B	-
5	L	-
7	Y	-
8	GR	-
10	L	-
11	SB	-
15	GR	-
16	O	-

Connector No.	E214
Connector Name	ECM RELAY
Connector Type	MS02EL-M2-LC-W



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	-
2	W	-
3	G	-
5	R	-

Connector No.	F-4
Connector Name	WIRE TO WIRE
Connector Type	NS18FW-GS



Terminal No.	Color of Wire	Signal Name [Specification]
2	L	-
3	P	-
6	B	-
9	G	-
10	R	-
11	L	-
12	P	-
13	G	-

JMBWA0569GB

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Type	Y01FGY



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-

Connector No.	F9
Connector Name	EGR VOLUME CONTROL VALVE
Connector Type	FEF 42032800



Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	5V
2	R	(-)
3	W	GND
5	BR	SIG
6	L	(+)

Connector No.	F23
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RI106FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	TEMP
2	L	GND
4	G	+APC
5	R	5V
6	Y	SIG

Connector No.	F30
Connector Name	ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE
Connector Type	E02FG-RS



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	(+)
2	B	(-)

Connector No.	F55
Connector Name	WIRE TO WIRE
Connector Type	TK20FEW



Terminal No.	Color of Wire	Signal Name [Specification]
8	GR	-
9	V	-
19	L	-
20	P	-

Connector No.	F61
Connector Name	GLOW CONTROL UNIT
Connector Type	FCJ 17Z11105A



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	GLOW PLUG 1
2	Y	GLOW PLUG 2
3	G	GLOW PLUG 3
4	W	GLOW PLUG 4
5	L	GLOW PLUG 5
6	B	GLOW PLUG 6
7	R	CONTROL
8	GR	DIAG
9	B	GND
10	W	+BAT
11	G	(+)

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	F62
Connector Name	ECM
Connector Type	AMP-0-1897635-2

109	108	107	106	105	104	103	102	101	100	99	98	97	96	95
124	123	122	121	120	119	118	117	116	115	114	113	112	111	110
108	107	106	105	104	103	102	101	100	99	98	97	96	95	
154	153	152	151	150	149	148	147	146	145	144	143	142	141	140



Terminal No.	Color of Wire	Signal Name [Specification]
95	W	INJ#1 LSD
96	G	INJ#2 LSD
97	B	INJ#3 LSD
98	BR	MPROP
99	B	PCV
100	G	OIL TEMP GND
101	V	FUEL TEMP
102	W	FUEL TEMP
104	R	GND FUEL TEMP
107	Y	GND FLAP POSITION
108	L	SIGNAL



Connector No.	F64
Connector Name	FUEL INJECTOR No.1
Connector Type	BOSCH 1928404072

110	R	INJ#1 HSD
111	BR	INJ#3 HSD
112	G	INJ#5 HSD
113	SB	EGR BY PASS VALVE
114	L	VNT ACTUATOR COIL
115	W	OIL TEMP SIG
120	L	AVCC TURBINE PRESS
121	Y	INTAKE FLAP POSITION
123	G	SUPPLY
125	G	INJ#6 HSD
126	R	INJ#2 HSD
127	G	INJ#4 HSD
128	LG	INTAKE FLAP DC (+)
129	SB	INTAKE FLAP DC (-)
130	O	GND WATER TEMP
131	R	TURBINE PRESS
132	Y	GND TURBINE PRESS
133	G	VCC
134	L	SIG
135	BR	EGR POSITION
137	Y	CRANK SHAFT SENS (-)
138	B	ELEC ENG MTG SOL
140	B	INJ#6 LSD
141	G	INJ#2 LSD
142	B	INJ#4 LSD



Connector No.	F65
Connector Name	FUEL INJECTOR No.3
Connector Type	BOSCH 1928404072

143	R	EGR DC (-)
144	L	EGR DC (+)
145	P	WATER TEMP
146	L	TURBINE TEMP
147	Y	GND TURBINE TEMP
148	BR	AVCC FLAP POSITION
149	Y	GND
150	W	GND EGR POSITION
151	BR	AVCC BOOST PRESS
152	L	CRANK SHAFT SENS (+)



Connector No.	F66
Connector Name	FUEL INJECTOR No.5
Connector Type	BOSCH 1928404072

Connector No.	F63
Connector Name	WIRE TO WIRE
Connector Type	MOORE-B-LC



3	2	1
6	5	4

Terminal	Color of Wire	Signal Name [Specification]
3	G	-
4	B	-
5	Y	-
6	L	-



Connector No.	F67
Connector Name	AIR FUEL RATIO SENSOR
Connector Type	AEU06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	(+)
2	W	(-)

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	(+)
2	G	(-)

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	(+)
2	B	(-)

Terminal	Color of Wire	Signal Name [Specification]
1	SB	PUMPING CURRENT
2	GR	PROBE GND
3	P	HEATER CONT
4	G	HEATER (+)
5	V	TRIM CURRENT
6	O	NERNST VOLTAGE

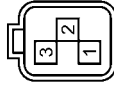
ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	F68
Connector Name	EXHAUST GAS TEMPERATURE SENSOR 1
Connector Type	RI02FBR



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	GND
2	L	SIG

Connector No.	F69
Connector Name	EXHAUST GAS PRESSURE SENSOR 1
Connector Type	AAZ03FB1-S



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	GND
2	R	VS
3	L	5V

Connector No.	F70
Connector Name	FUEL INJECTOR No.2
Connector Type	BOSCH 1928404073



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	(+)
2	G	(-)

Connector No.	F71
Connector Name	FUEL INJECTOR No.4
Connector Type	BOSCH 1928404072



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	(+)
2	B	(-)

Connector No.	F72
Connector Name	FUEL INJECTOR No.6
Connector Type	BOSCH 1928404072



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	(+)
2	B	(-)

Connector No.	F73
Connector Name	CAMSHAFT POSITION SENSOR
Connector Type	FEA03FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	GND
2	Y	SIG
3	G	AIN

Connector No.	F74
Connector Name	FUEL RAIL PRESSURE REGULATION ACTUATOR
Connector Type	BOSCH 1928404072



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	-
2	B	-

Connector No.	F80
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	YZK 7283-5393-10



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	SIG
2	Y	GND

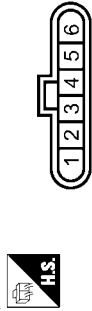
ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	F81
Connector Name	ENGINE OIL TEMPERATURE/LEVEL SENSOR
Connector Type	FCL 211FT0408



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	OIL TEMP SIG
2	G	OIL TEMP GND
3	L	OIL LEVEL GND
4	SB	OIL LEVEL SIG

Connector No.	F83
Connector Name	ELECTRICALLY-CONTROLLED COOLING FAN COUPLING
Connector Type	AA006FB-WP



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	POWER
2	P	SENS POWER
3	Y	TO USM
4	L	SENS GND
5	V	SIGNAL
6	B	EARTH

Connector No.	F84
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	RH02FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	O	GND
2	P	SIG

Connector No.	F85
Connector Name	FUEL TEMPERATURE SENSOR
Connector Type	FEA02FGY-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	SIG
2	W	GND

Connector No.	F86
Connector Name	FUEL FLOW ACTUATOR
Connector Type	BOSCH 1928404072



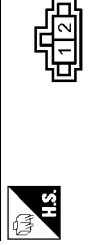
Connector No.	F87
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB



Connector No.	F89
Connector Name	WIRE TO WIRE
Connector Type	terault 7703297412



Connector No.	F90
Connector Name	EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE
Connector Type	BS02FB-AHY-S



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	BR	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	(-)
2	LG	(+)
3	R	GND
5	BR	5V
6	Y	SIG

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-
2	Y	-
3	L	-
4	G	-
5	L	-
6	Y	-
7	L	-
8	G	-
10	B	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	SB	-

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	F250
Connector Name	WIRE TO WIRE
Connector Type	-



Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
10	-	-

Connector No.	F251
Connector Name	GLOW PLUG No.1
Connector Type	AZZ01FB-1V



Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

Connector No.	F252
Connector Name	GLOW PLUG No.2
Connector Type	AZZ01FB-1V



Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

Connector No.	F253
Connector Name	GLOW PLUG No.3
Connector Type	AZZ01FB-1V



Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

Connector No.	F254
Connector Name	GLOW PLUG No.4
Connector Type	AZZ01FB-1V



Connector No.	F255
Connector Name	GLOW PLUG No.5
Connector Type	AZZ01FB-1V



Connector No.	F256
Connector Name	GLOW PLUG No.6
Connector Type	AZZ01FB-1V



Connector No.	F260
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	-



Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

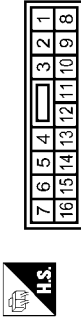
Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-

Terminal No.	Color of Wire	Signal Name [Specification]
1	-	-
2	-	-
3	-	-

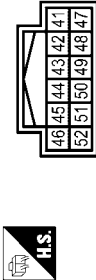
ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	M3
Connector Name	WIRE TO WIRE
Connector Type	NS16FGY-GS



Terminal No.	Color of Wire	Signal Name [Specification]
10	P	-
11	L	-

Connector No.	M22
Connector Name	COMBINATION METER
Connector Type	TH12FW



Terminal No.	Color of Wire	Signal Name [Specification]
51	P	OIL LEVEL SENSOR (+)
52	SB	OIL LEVEL SENSOR (-)

Connector No.	M23
Connector Name	COMBINATION METER
Connector Type	TH40FW



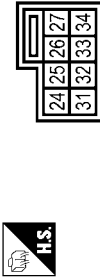
Terminal No.	Color of Wire	Signal Name [Specification]
11	P	CAN L
12	L	CAN H

Connector No.	M31
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FY-EX-1V



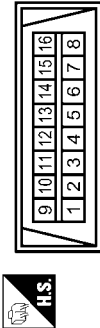
Terminal No.	Color of Wire	Signal Name [Specification]
40	BR	-
41	B	-

Connector No.	M32
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FGY-1V



Terminal No.	Color of Wire	Signal Name [Specification]
27	R	-
31	B	-
32	SB	-

Connector No.	M45
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



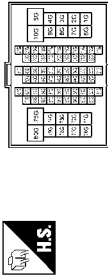
Terminal No.	Color of Wire	Signal Name [Specification]
4	B	GND
5	B	GND
6	L	CAN (+)
7	SB	K-LINE
8	W	IGN
14	P	CAN (-)
16	Y	+B

Connector No.	M88
Connector Name	FUSE BLOCK (JB)
Connector Type	NS16FW-GS



Terminal No.	Color of Wire	Signal Name [Specification]
8A	Y	-

Connector No.	M91
Connector Name	WIRE TO WIRE
Connector Type	TH60FW-AS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
36G	P	-
37G	SB	-
42G	B	-
43G	SB	-
48G	SB	-
51G	P	-
52G	L	-
54G	BR	-
64G	B	-

ENGINE CONTROL SYSTEM (V9X ENGINE WITHOUT DIESEL PARTICULATE FILTER)

Connector No.	M302	Connector No.	M303
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)	Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08F-GY	Connector Type	TK03F-W



Terminal No.	Color of Wire	Signal Name [Specification]
16	R	-
17	B	-
21	Y	-

Terminal No.	Color of Wire	Signal Name [Specification]
7	V	-
8	O	-

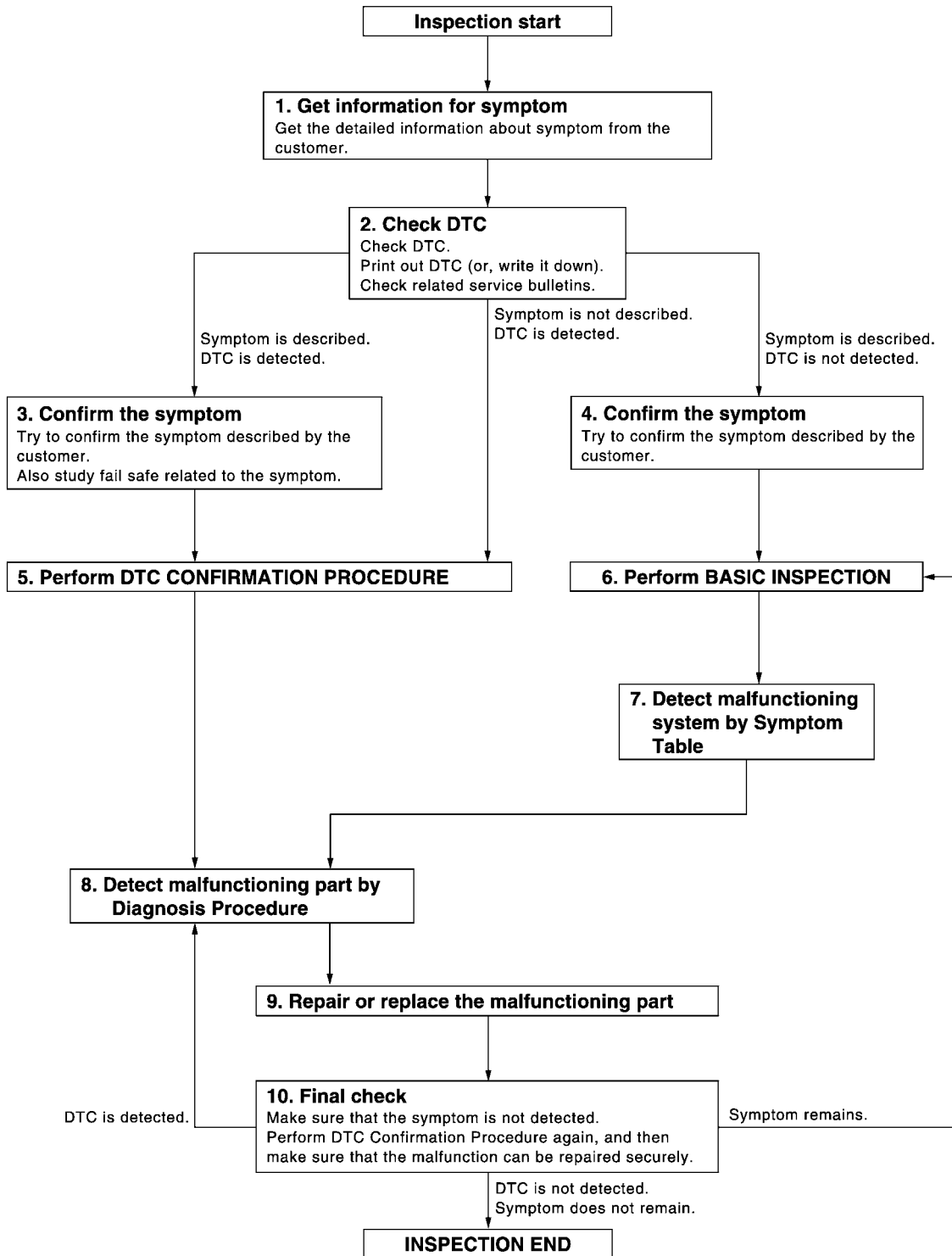
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000006466458

OVERALL SEQUENCE



DETAILED FLOW

JMBIA1804GB

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to [EC-1311, "Diagnostic Work Sheet"](#).)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC. (Print them out with CONSULT-III or GST.)
 - Erase DTC. (Refer to [EC-1262, "Diagnosis Description"](#).)
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC-1530, "Symptom Table"](#).)
3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).

Also study the fail safe related to the symptom. Refer to [EC-1285, "Fail Safe"](#).

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC.

If two or more DTCs are detected, refer to [EC-1287, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 8.

NO >> Check according to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

6.PERFORM BASIC INSPECTION

Perform [EC-1323, "Work Procedure"](#).

>> GO TO 7.

7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-1530, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 8.

8. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure.

Is malfunctioning part detected?

YES >> GO TO 9.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-III. Refer to [EC-1270, "Reference Value"](#).

9. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to [EC-1262, "Diagnosis Description"](#).

>> GO TO 10.

10. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 8.

YES-2 >> Symptom remains: GO TO 6.

NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM.

Diagnostic Work Sheet

INFOID:000000006466459

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MI to come on steady and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE Road conditions
HOW Operating conditions,
 Weather conditions,
 Symptoms

SEF907L

[V9X]

< BASIC INSPECTION >

WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [_____]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [_____]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [_____]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [_____]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[V9X]

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:000000006466460

When replacing ECM, this procedure must be performed.

NOTE:

The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313. "Work Procedure"](#).

Work Procedure

INFOID:000000006466461

1.SAVE ECM DATA

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "SAVE DATA FOR CPU REPLC" in "WORK SUPPORT" mode of "ENGINE" using CONSULT-III.
5. Follow the instruction of CONSULT-III display.

NOTE:

Necessary data in ECM is copied and saved to CONSULT-III.

Is operation completed successfully?

YES >> GO TO 2.

NO >> GO TO 6.

2.REPLACE ECM

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Replace ECM. Refer to [EC-1541. "Removal and Installation"](#).

>> GO TO 3.

3.PERFORM PROGRAMMING

Refer to "CONSULT-III Operation Manual".

>> GO TO 4.

4.PERFORM ECM KEY ID REGISTRATION

Refer to "CONSULT-III Operation Manual NATS-IVIS/NVIS".

>> GO TO 5.

5.WRITE ECM DATA

1. Select "WRT DATA AFTR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT-III.
2. Follow the instruction of CONSULT-III display.

NOTE:

The data saved by "SAVE DATA FOR CPU REPLC" is written to ECM.

Is operation completed successfully?

YES >> GO TO 11.

NO >> GO TO 9.

6.REPLACE ECM

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Replace ECM. Refer to [EC-1541. "Removal and Installation"](#).

>> GO TO 7.

7.PERFORM PROGRAMMING

Refer to "CONSULT-III Operation Manual".

ADDITIONAL SERVICE WHEN REPLACING ECM

[V9X]

< BASIC INSPECTION >

>> GO TO 8.

8.PERFORM ECM KEY ID REGISTRATION

Refer to "CONSULT-III Operation Manual NATS-IVIS/NVIS".

>> GO TO 9.

9.PERFORM G SENSOR CALIBRATION

Perform [AT-436, "Special Repair Requirement"](#).

>> GO TO 10.

10.PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform [EC-1316, "Work Procedure"](#).

>> GO TO 11.

11.PERFORM ZFC VALUE RESET

Perform [EC-1315, "Work Procedure"](#).

>> GO TO 12.

12.PERFORM EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Perform [EC-1319, "Work Procedure"](#).

>> GO TO 13.

13.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-1321, "Work Procedure"](#).

>> GO TO 14.

14.PERFORM INITIALIZATION OF ASCD

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Turn ignition switch ON.
3. Press the ASCD MAIN switch for at least 1 second.

Is this work after "WRT DATA AFTR REPLC CPU" was completed?

YES >> INSPECTION END
NO >> GO TO 15.

15.CHANGE ENGINE OIL

Refer to [LU-36, "Draining"](#) or [LU-36, "Refilling"](#).

>> GO TO 16.

16.PERFORM ENGINE OIL DATA RESET

Perform [EC-1322, "Work Procedure"](#).

>> GO TO 17.

17.CHECK DTC

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Turn ignition switch ON.
3. Check DTC. If DTC is displayed, erase it. Refer to [EC-1262, "Diagnosis Description"](#).

>> END

ZFC VALUE RESET

< BASIC INSPECTION >

[V9X]

ZFC VALUE RESET

Description

INFOID:000000006466462

Wear of injector opening portion (blocking or enlargement of the hole) due to secular change causes error of injected amount of fuel resulting in smoke or large noise.

To prevent these conditions, ECM learns ZFC (Zero Fuel Calibration) and NVC (Nominal Voltage Calibration). This function resets ZFC and NVC.

This work should be performed after the following operation.

- ECM is replaced.

NOTE:

The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313, "Work Procedure"](#).

- Injector(s) are replaced.

Work Procedure

INFOID:000000006466463

1. START

1. Turn ignition switch ON.
2. Perform "ZFC VALUE RESET " in WORK SUPPORT mode with CONSULT-III.
3. Wait at least 10 seconds.

>> END

INJECTOR ADJUSTMENT VALUE REGISTRATION

< BASIC INSPECTION >

[V9X]

INJECTOR ADJUSTMENT VALUE REGISTRATION

Description

INFOID:000000006466464

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.

The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.

A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.

- Injector(s) are replaced.
 - Injector Adjustment Value Registration for the replaced fuel injector must be performed.
- ECM is replaced.
 - Injector Adjustment Value Registration for all the fuel injectors must be performed.

NOTE:

The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313, "Work Procedure"](#).

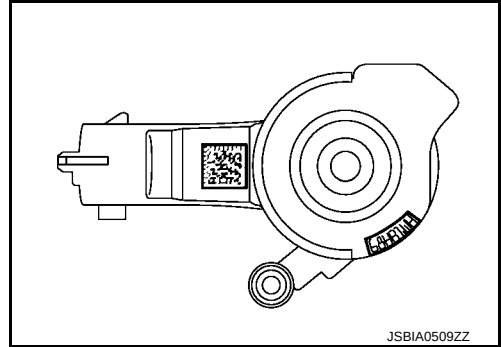
For injector adjustment value, refer to the following table.

NOTE:

"J" and "Q", "9" and "0 (zero)" are not applied.

Input character	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Stamping on injector	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Input character	1	2	3	4	5	6	7	8	9	0																
Stamping on injector	1	2	3	4	5	6	7	8	9	0																

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Work Procedure

INFOID:000000006466465

1.START

NOTE:

- Before performing this procedure, record injector adjustment value printed on a fuel injector.

1. Turn ignition switch ON (engine stopped).
2. Select "INJ ADJ VAL REGIST" in "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START".

NOTE:

When touching "START", CONSULT-III reads injector adjustment values stored in ECM.

4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value.

NOTE:

- For injector adjustment value, refer to the following table.

INJECTOR ADJUSTMENT VALUE REGISTRATION

< BASIC INSPECTION >

[V9X]

- “J” and “Q”, “9” and “0 (zero)” are not applied.

Input character	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Stamping on injector	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Input character	1	2	3	4	5	6	7	8	9	0																
Stamping on injector	1	2	3	4	5	6	7	8	9	0																

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- Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.

NOTE:

When touching “START”, injector adjustment values stored in CONSULT-III are written onto ECM memory.

- Check that the following values are same for each cylinder.
 - Injector adjustment value which is printed on a fuel injector.
 - Injector adjustment value which is displayed on CONSULT-III screen.

NOTE:

- In this step, CONSULT-III reads injector adjustment values stored in ECM and displays the values on the CONSULT-III screen. This is for checking if injector adjustment values are written onto ECM memory correctly.
 - If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.
- Turn ignition switch OFF and wait at least 4 minutes.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

< BASIC INSPECTION >

[V9X]

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

Description

INFOID:000000006466466

EGR volume control valve closed position learning value should be cleared under the following cases.

- EGR volume control valve is removed.
- EGR volume control valve is replaced.

Work Procedure

INFOID:000000006466467

1.START

1. Turn ignition switch ON.
2. Select "EGR/V LEARN CLR" in "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START" and wait a few seconds.
4. Check that the "CMPLT" is displayed on CONSULT-III screen.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[V9X]

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Description

INFOID:000000006466468

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve position sensor output signal. It must be performed under any of the following conditions:

- EGR volume control valve is removed.
- EGR volume control valve is replaced.
- ECM is replaced.

NOTE:

The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313, "Work Procedure"](#).

Work Procedure

INFOID:000000006466469

1. START

1. Start the engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 4 minutes.
3. Turn ignition switch ON and wait for 5 seconds.

NOTE:

Check that EGR volume control valve moves by confirming the operating sound.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING VALUE CLEAR

< BASIC INSPECTION >

[V9X]

THROTTLE VALVE CLOSED POSITION LEARNING VALUE CLEAR

Description

INFOID:000000006466470

Throttle valve closed position learning value should be cleared under the following cases.

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.

Work Procedure

INFOID:000000006466471

1.START

1. Turn ignition switch ON.
2. Select "TP POS LEARN CLR" in "WORK SUPPORT" mode with CONSULT-III
3. Touch "START" and wait a few seconds.
4. Check that the "CMPLT" is displayed on CONSULT-III screen.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[V9X]

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:000000006466472

Throttle valve closed position learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.
- ECM is replaced.

NOTE:

The necessary operation is different depending on the operation result of ECM data save or write. Always perform the operation according to procedures. Refer to [EC-1313, "Work Procedure"](#).

Work Procedure

INFOID:000000006466473

1.START

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 20 seconds.
3. Turn ignition switch OFF and wait at least 4 minutes.

NOTE:

Check that throttle valve moves by confirming the operating sound.

>> END

ENGINE OIL DATA RESET

< BASIC INSPECTION >

[V9X]

ENGINE OIL DATA RESET

Description

INFOID:000000006466474

The oil change alert function allows calculating the remaining distance to drive before oil change request. The engine oil data reset must be performed after engine oil is changed.

Work Procedure

INFOID:000000006466475

1. ENGINE OIL DATA RESET

Refer to [EC-1261. "OIL CONTROL SYSTEM : Reset Operation"](#).

>> END

BASIC INSPECTION

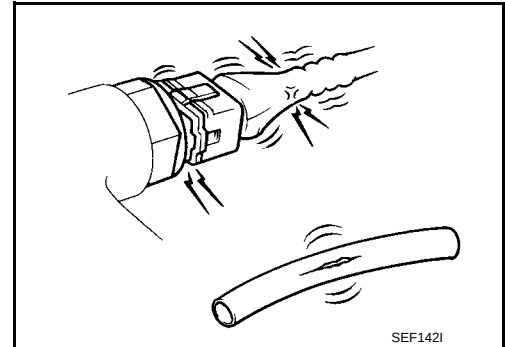
Work Procedure

INFOID:000000006466476

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to [FL-30, "Removal and Installation"](#) or [EM-297, "Removal and Installation"](#).
3. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Vacuum hoses for splits, kinks, or improper connections
 - Wiring for improper connections, pinches, or cuts
4. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.



2.CHECK IDLE SPEED

Check idle speed.

For procedure, refer to [EC-1540, "Inspection"](#).

For specification, refer to [EC-1545, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Stop engine.
2. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace. Refer to [EM-300, "Exploded View"](#).

4.BLEED AIR FROM FUEL SYSTEM

Use priming pump to bleed air from fuel system. Refer to [FL-31, "Air Bleeding"](#).

>> GO TO 5.

5.CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1540, "Inspection"](#).

For specification, refer to [EC-1545, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to [FL-32, "Draining Water from Fuel Filter"](#).

>> GO TO 7.

7. CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1540, "Inspection"](#).

For specification, refer to [EC-1545, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 8.

8. CHECK AIR CLEANER FILTER

1. Stop engine.

2. Check air cleaner filter for clogging or breaks.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace air cleaner filter. Refer to [EM-300, "Exploded View"](#).

9. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. CHECK BATTERY

Refer to [SC-5, "Battery Test and Charging Chart"](#).

Is the inspection result normal?

YES >> Check charging system. Refer to [SC-13, "System Description"](#).

NO >> Repair or replace. Refer to [SC-11, "Removal and Installation"](#).

11. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-292, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Follow the instruction of "CHECKING COMPRESSION PRESSURE". Refer to [EM-292, "Inspection"](#).

12. CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-1540, "Inspection"](#).

For specification, refer to [EC-1545, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> 1. Replace fuel injector. Refer to [EM-316, "Removal and Installation"](#).

2. Perform [EC-1316, "Work Procedure"](#).

3. Perform [EC-1315, "Work Procedure"](#).

4. GO TO 2.

DTC/CIRCUIT DIAGNOSIS**POWER SUPPLY AND GROUND CIRCUIT****Diagnosis Procedure**

INFOID:000000006466477

1.CHECK FUSE

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
IPDM E/R	#31	30 A
	#55	15 A
	#64	10 A

Is the fuse fusing?

- YES >> Replace the fuse after repairing the applicable circuit.
 NO >> GO TO 2.

2.CHECK GROUND CONNECTION

Check ground connection E21. Refer to Ground Inspection in [PG-36, "Ground Distribution"](#).

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace ground connection.

3.CHECK ECM GROUND CIRCUIT FOR OPEN

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY-I

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		−	Voltage
ECM			
Connector	Terminal		
E207	18	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5
 NO >> GO TO 6.

5.CHECK ECM POWER SUPPLY-II

Check the voltage between ECM harness connector and ground.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage
ECM			
Connector	Terminal		
E207	3	Ground	Battery voltage
	5		
	6		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 7.

6.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E207	18	E12	17	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between ECM harness connector and ECM relay harness connector.

+		-		Continuity
ECM		ECM relay		
Connector	Terminal	Connector	Terminal	
E207	3	E214	5	Existed
	5			
	6			

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM POWER SUPPLY-III

1. Turn ignition switch ON.
2. Check the voltage between ECM relay harness connector and ground.

+		-	Voltage
ECM relay			
Connector	Terminal		
E214	3	Ground	Battery voltage

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 9.
NO >> Perform the trouble diagnosis for power supply circuit.

9.CHECK ECM POWER SUPPLY-IV

1. Install ECM relay.
2. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E207	49	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK ECM RELAY

Check ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

11.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between ECM harness connector and ECM relay harness connector.

+		-		Continuity
ECM		ECM relay		
Connector	Terminal	Connector	Terminal	
E207	49	E214	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12.CHECK ECM POWER SUPPLY-V

1. Turn ignition switch ON.
2. Check the voltage between ECM relay harness connector and ground.

+		-	Voltage
ECM relay			
Connector	Terminal		
E214	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 13.
NO >> GO TO 14.

13.CHECK ECM RELAY

Check ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

14.CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM relay harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E214	1	E13	30	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection (ECM Relay)

INFOID:000000006466478

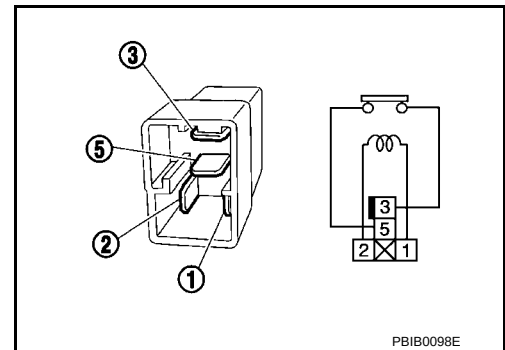
1.CHECK ECM RELAY

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between ECM relay terminals as per the following conditions.

+	—	Conditions	Continuity
ECM relay			
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).



U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

U1000 CAN COMM CIRCUIT

Description

INFOID:000000006466479

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H-line, CAN L-line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000006466480

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1000	CAN COMM CIRCUIT (CAN communication line)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1329, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466481

Perform the trouble diagnosis for CAN communication system. Refer to [LAN-46, "CAN System Specification Chart"](#).

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

U1001 CAN COMM CIRCUIT

Description

INFOID:000000006466482

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H-line, CAN L-line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000006466483

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1001	CAN COMM CIRCUIT (CAN communication line)	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1330, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466484

Perform the trouble diagnosis for CAN communication system. Refer to [LAN-46, "CAN System Specification Chart"](#).

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:000000006466485

DTC DETECTION LOGIC

NOTE:

If DTC P0016 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0016	CMP/CKP RELATION (Crankshaft position - camshaft position correlation)	Correlation between crankshaft position sensor signal and camshaft position sensor signal becomes less than 24° more than 12° when engine speed is 50 rpm or more.	• Harness or connectors - (CKP sensor circuit is open or shorted.) - (CMP sensor circuit is open or shorted.) • Crankshaft position sensor • Camshaft position sensor • Timing chain

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1331, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466486

1. CHECK CAMSHAFT POSITION SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor harness connector terminals.

CMP sensor			Voltage
Connector	+	−	
	Terminal		
F73	3	1	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK CMP SENSOR POWER SUPPLY-II

Check the voltage between CMP sensor harness connector and ground.

+		-	Voltage
CMP sensor			
Connector	Terminal		
F73	3	Ground	Battery voltage

P0016 CKP - CMP CORRELATION

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between CMP sensor harness connector and ECM relay harness connector.

+		-		Continuity
CMP sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F73	3	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

+		-		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	1	E207	45	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Repair or replace error-detected parts.

6.CHECK CMP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	2	E207	46	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK CMP SENSOR

Check CMP sensor. Refer to [EC-1335, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace CMP sensor. Refer to [EM-363, "Exploded View"](#).

8.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-I

1. Reconnect ECM harness connector.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector terminals.

CKP sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F80	1	2	5 V

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 9.

9.CHECK CKP SENSOR POWER SUPPLY-II

Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F80	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

+		-		Continuity
CKP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F80	1	F62	152	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

P0016 CKP - CMP CORRELATION

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

11. CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

+		-		Continuity
CKP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F80	2	F62	137	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

13. CHECK CKP SENSOR

Check CKP sensor. Refer to [EC-1335, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace CKP sensor. Refer to [EC-1228, "Component Parts Location"](#).

14. CHECK CAMSHAFT RH (BANK2)

Visually check for camshaft RH (bank2).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Repair or replace camshaft RH (bank2). Refer to [EM-363, "Exploded View"](#).

15. CHECK SIGNAL PLATE WITH DRIVE PLATE

Visually check for chipping signal plate with drive plate.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace signal plate with drive plate. Refer to [EM-377, "Exploded View"](#).

16. CHECK TIMING CHAIN

Check timing chain. Refer to [EM-323, "Removal and Installation"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0016 CKP - CMP CORRELATION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace timing chain. Refer to [EM-323, "Removal and Installation"](#).

Component Inspection (Crankshaft Position Sensor)

INFOID:000000006466487

1.CHECK CRANKSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Check the resistance between CKP sensor terminals.

+	−	Resistance
CKP sensor		
Terminal		
1	2	600 - 1,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EC-1228, "Component Parts Location"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000006466488

1.CHECK CAMSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Check the resistance between CMP sensor terminals.

+	—	Resistance
CMP sensor		
Terminal		
2	3	9.0 - 11.0 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CMP sensor. Refer to [EM-363, "Exploded View"](#).

P0045 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000006466489

DTC DETECTION LOGIC

NOTE:

If DTC P0045 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0045	TC BOOST SOL/V (Turbocharger boost control solenoid valve circuit)	- ECM detects open circuit of turbocharger boost control solenoid valve circuit for 0.4 second or more when turbocharger boost control solenoid valve is not actuated. - ECM detects short circuit to ground of turbocharger boost control solenoid valve circuit for 0.4 second or more when turbocharger boost control solenoid valve is not actuated. - ECM detects short circuit to power supply of turbocharger boost control solenoid valve circuit for 0.4 second or more when turbocharger boost control solenoid valve is actuated. - ECM detects turbocharger boost control solenoid valve is not actuated for 0.5 second or more.	- Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) - Turbocharger boost control solenoid valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1336, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466490

1. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE FUNCTION

With CONSULT-III

- Turn ignition switch ON.
- Select "ACTIVE TEST" mode of "ENGINE" with CONSULT-III.
- Perform "TC BST CONT S/V" of active test item.
- With operating the test item, check that TC boost control actuator rod moves.

Without CONSULT-III

Check that TC boost control actuator rod moves slightly when engine is started.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 2.

2. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect turbocharger boost control solenoid valve harness connector.
- Turn ignition switch ON.
- Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

P0045 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		–	Voltage
Turbocharger boost control solenoid valve			
Connector	Terminal		
E220	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM relay harness connector.

+		-		Continuity
Turbocharger boost control solenoid valve		ECM relay		
Connector	Terminal	Connector	Terminal	
E220	2	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
E220	1	F62	114	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

P0045 TC BOOST CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check turbocharger boost control solenoid valve. Refer to [EC-1338, "Component Inspection \(Turbocharger Boost Control Solenoid Valve\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace turbocharger boost control solenoid valve. Refer to [EC-1543, "Hydraulic Layout"](#).

Component Inspection (Turbocharger Boost Control Solenoid Valve)

INFOID:0000000006466491

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Check the resistance between turbocharger boost control solenoid valve terminals.

+	—	Resistance
Turbocharger boost control solenoid valve		
Terminal		
1	2	6 Ω - 1 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace turbocharger boost control solenoid valve. Refer to [EC-1543, "Hydraulic Layout"](#).

P0089 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0089 FUEL PUMP

DTC Logic

INFOID:000000006466492

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0089	FUEL PUMP (High pressure fuel pump performance)	Fuel pressure is out of the target range.	• High pressure fuel pump • Fuel injector • Fuel filter • Air mixed with fuel • Lack of fuel • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1339, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466493

1.PERFORM FUEL FILTER AIR BLEEDING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

1. Turn ignition switch ON.
2. Perform fuel filter air bleeding. Refer to [FL-31, "Air Bleeding"](#).
3. Erase DTC.
4. Perform DTC confirmation procedure again. Refer to [EC-1339, "DTC Logic"](#).

Is the DTC P0089 detected again?

- YES >> GO TO 2.
NO >> INSPECTION END

2.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace fuel filter. Refer to [FL-30, "Removal and Installation"](#).

3.CHECK FOR FUEL LEAK

Check for fuel leakage at fuel circuit.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning parts.

4.CHECK FUEL FLOW ACTUATOR

Check fuel flow actuator. Refer to [EC-1340, "Component Inspection \(Fuel Flow Actuator\)"](#).

P0089 FUEL PUMP

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace high pressure fuel pump assembly. Refer to [EM-304, "Removal and Installation"](#).

5.CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR

Check fuel rail pressure regulation actuator. Refer to [EC-1340, "Component Inspection \(Fuel Rail Pressure Regulation Actuator\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel rail (bank 2 side) assembly. Refer to [EM-315, "Exploded View"](#).

6.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1340, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> Replace high pressure fuel pump. Refer to [EM-304, "Removal and Installation"](#).

NO >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-316, "Removal and Installation"](#).

Component Inspection (Fuel Flow Actuator)

INFOID:000000006466494

1.CHECK FUEL FLOW ACTUATOR

1. Turn ignition switch OFF.
2. Disconnect fuel flow actuator harness connector.
3. Check the resistance between fuel flow actuator.

+	—	Resistance
Fuel flow actuator		
Terminal		
1	2	2.1 - 3.9 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump assembly. Refer to [EM-304, "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:000000006466495

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

+	−	Resistance
Fuel injector		
Terminal		
1	2	150 - 210 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-316, "Removal and Installation"](#).

Component Inspection (Fuel Rail Pressure Regulation Actuator)

INFOID:000000006466496

1.CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR

1. Turn ignition switch OFF.
2. Disconnect fuel rail pressure regulation actuator harness connector.
3. Check the resistance between fuel rail pressure regulation actuator.

P0089 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+	—	Resistance
Fuel rail pressure regulation actuator		
Terminal		
1	2	1 - 30 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel rail (bank 2 side) assembly. Refer to [EM-315, "Exploded View"](#).

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P0090 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0090 FUEL PUMP

DTC Logic

INFOID:000000006466497

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0090	FUEL PUMP (Fuel flow actuator circuit)	- ECM detects open circuit of fuel flow actuator circuit for 0.3 second or more when fuel flow actuator does not operate in ignition switch ON. - ECM detects short circuit to ground of fuel flow actuator circuit for 0.3 second or more when fuel flow actuator operate in ignition switch ON. - ECM detects short circuit to power supply of fuel flow actuator circuit for 0.3 second or more when fuel flow actuator operate in ignition switch ON. - ECM detects fuel flow actuator does not operate in ignition switch ON for 0.3 second or more.	- Harness or connectors (Fuel flow actuator circuit is open or shorted.) - Fuel flow actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1343, "Component Inspection \(Fuel Flow Actuator\)"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466498

1.CHECK FUEL FLOW ACTUATOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect fuel flow actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel flow actuator harness connector and ground.

+		-	Voltage
Fuel flow actuator			
Connector	Terminal		
F86	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK FUEL FLOW ACTUATOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
- Check the continuity between fuel flow actuator harness connector and ECM relay harness connector.

P0090 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
Fuel flow actuator		ECM relay		
Connector	Terminal	Connector	Terminal	
F86	1	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL FLOW ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel flow actuator harness connector and ECM harness connector.

+		-		Continuity
Fuel flow actuator		ECM		
Connector	Terminal	Connector	Terminal	
F86	2	F62	98	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL FLOW ACTUATOR

Check fuel flow actuator. Refer to [EC-1343, "Component Inspection \(Fuel Flow Actuator\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace high pressure fuel pump assembly. Refer to [EM-304, "Removal and Installation"](#).

Component Inspection (Fuel Flow Actuator)

INFOID:0000000006466499

1.CHECK FUEL FLOW ACTUATOR

1. Turn ignition switch OFF.
2. Disconnect fuel flow actuator harness connector.
3. Check the resistance between fuel flow actuator.

P0090 FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+	−	Resistance
Fuel flow actuator		
Terminal		
1	2	2.1 - 3.9 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump assembly. Refer to [EM-304, "Removal and Installation"](#).

P0100 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0100 MAF SENSOR

DTC Logic

INFOID:000000006466500

DTC DETECTION LOGIC

NOTE:

If DTC P0100 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0100	MAF SENSOR (Mass air flow sensor circuit)	- ECM detects open circuit of mass air flow sensor circuit for 0.5 second or more. - ECM detects short circuit to power supply of mass air flow sensor circuit for 1 second or more. - ECM detects short circuit to ground of mass air flow sensor circuit for 0.5 second or more. - ECM detects improper voltage from the mass air flow sensor for 1.5 seconds or more, after ignition switch OFF.	- Harness or connectors (Mass air flow sensor circuit is open or shorted.) - Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 2 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1345, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- Turn ignition switch OFF and wait at least 4 minutes.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1345, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466501

1.CHECK MASS AIR FLOW SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between mass air flow sensor harness connector terminals.

Mass air flow sensor			Voltage
Connector	+	-	
	Terminal		
F23	4	2	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

P0100 MAF SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK MASS AIR FLOW SENSOR POWER SUPPLY-II

Check the voltage between mass air flow sensor harness connector and ground.

+		–	Voltage
Mass air flow sensor			
Connector	Terminal		
F23	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between mass air flow sensor harness connector and ECM relay harness connector.

+		-		Continuity
Mass air flow sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F23	4	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		-		Continuity
Mass air flow sensor		ECM		
Connector	Terminal	Connector	Terminal	
F23	5	E207	19	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		-		Continuity
Mass air flow sensor		ECM		
Connector	Terminal	Connector	Terminal	
F23	2	E207	21	Existed

Is the inspection result normal?

YES >> GO TO 6.

P0100 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

7.CHECK MASS AIR FLOW SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		-		Continuity
Mass air flow sensor		ECM		
Connector	Terminal	Connector	Terminal	
F23	6	E207	43	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to [EC-1347, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace mass air flow sensor. Refer to [EM-300, "Exploded View"](#).

Component Inspection (Mass Air Flow Sensor)

INFOID:0000000006466502

1.CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Start the engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
E207	43 (MAF sensor signal)	21 (Sensor ground)	Ignition switch ON (Engine stopped.)	0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	1.2 V
			Idle to about 2,000 rpm	1.2 V → 2.7 V*

*:Check for linear voltage rise in response to engine being increased to about 2,000 rpm.

P0100 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor. Refer to [EM-300, "Exploded View"](#).

P0110 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0110 IAT SENSOR

DTC Logic

INFOID:000000006466503

DTC DETECTION LOGIC

NOTE:

If DTC P0110 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Refer to [EC-1446, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0110	IAT SENSOR (Intake air temperature sensor circuit)	- ECM detects open circuit of intake air temperature sensor circuit for 1.2 seconds or more. - ECM detects short circuit to power supply of intake air temperature sensor circuit for 1.2 seconds or more. - ECM detects short circuit to ground of intake air temperature sensor circuit for 1.2 seconds or more.	- Harness or connectors (Intake air temperature sensor circuit is open or shorted.) - Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1349, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466504

1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between mass air flow sensor harness connector terminals.

Mass air flow sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F23	1	2	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between mass air flow sensor harness connector and ground.

P0110 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage (Approx.)
Mass air flow sensor			
Connector	Terminal		
F23	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		-		Continuity
Mass air flow sensor		ECM		
Connector	Terminal	Connector	Terminal	
F23	1	E207	44	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		-		Continuity
Mass air flow sensor		ECM		
Connector	Terminal	Connector	Terminal	
F23	2	E207	21	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK INTAKE AIR TEMPERATURE SENSOR

Check mass air flow sensor. Refer to [EC-1351, "Component Inspection \(Intake Air Temperature Sensor\)"](#).

P0110 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to [EM-300, "Exploded View"](#).

Component Inspection (Intake Air Temperature Sensor)

INFOID:0000000006466505

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check the resistance between mass air flow sensor terminals as per the following conditions.

+	–	Condition	Resistance
Mass air flow sensor			
Terminal			
1	2	25°C (77°F)	1.8 - 2.2 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to [EM-300, "Exploded View"](#).

P0115 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0115 ECT SENSOR

DTC Logic

INFOID:000000006466506

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0115	ECT SENSOR (Engine coolant temperature sensor circuit)	- ECM detects open circuit for 1 second or more. - ECM detects short circuit to power supply of engine coolant temperature sensor circuit for 1 second or more. - ECM detects short circuit to ground of engine coolant temperature sensor circuit for 1 second or more.	- Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) - Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1352, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466507

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect engine coolant temperature sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between engine coolant temperature sensor harness connector terminals.

Engine coolant temperature sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F84	2	1	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between engine coolant temperature sensor harness connector and ground.

+		–	Voltage (Approx.)
Engine coolant temperature sensor			
Connector	Terminal		
F84	2	Ground	5 V

Is the inspection result normal?

P0115 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		-		Continuity
Engine coolant temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F84	2	F62	145	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

+		-		Continuity
Engine coolant temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F84	1	F62	130	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Repair or replace error-detected parts.

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to [EC-1354, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0115 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace engine coolant temperature sensor. Refer to [CO-82, "Exploded View"](#).

Component Inspection

INFOID:000000006466508

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Check the resistance between engine coolant temperature sensor terminals.

+	−	Resistance
Engine coolant temperature sensor		
Terminal		
1	2	100 Ω - 10 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to [CO-82, "Exploded View"](#).

P0120 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0120 TP SENSOR

DTC Logic

INFOID:000000006466509

DTC DETECTION LOGIC

NOTE:

If DTC P0120 is display with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0120	TP SENSOR (Throttle position sensor circuit)	- ECM detects open circuit of throttle position sensor circuit for 0.3 second or more. - ECM detects short circuit to power supply of throttle position sensor circuit for 0.3 second or more. - ECM detects short circuit to ground of throttle position sensor circuit for 0.3 second or more.	- Harness or connectors (Throttle position sensor circuit is open or shorted.) - Throttle position sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1355, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466510

1. CHECK THROTTLE POSITION SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect throttle position sensor harness connector.
- Turn ignition switch ON.
- Check the voltage throttle position sensor harness connector terminals.

Throttle position sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F87	5	3	5 V

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY-II

Check the voltage throttle position sensor harness connector and ground.

+		-	Voltage (Approx.)
Throttle position sensor			
Connector	Terminal		
F87	5	Ground	5 V

P0120 TP SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity throttle position sensor harness connector and ECM harness connector.

+		-		Continuity
Throttle position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	5	F62	148	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity throttle position sensor harness connector and ECM harness connector.

+		-		Continuity
Throttle position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	3	F62	104	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Repair or replace error-detected parts.

6.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity throttle position sensor harness connector and ECM harness connector.

P0120 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
Throttle position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	6	F62	121	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to [EC-1357, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace electric throttle control actuator assembly. Refer to [EM-309, "Removal and Installation"](#).

Component Inspection

INFOID:000000006466511

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	Terminal			
	+	−		
F62	121	104	For 20 seconds after turning ignition switch OFF	Output voltage fluctuates between 0 V and 5 V
			More than 20 seconds after turning ignition switch OFF*	0.7 V

*: Repeat several times opening and shutting after turning ignition switch OFF.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator assembly. Refer to [EM-309, "Removal and Installation"](#).

P012B TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P012B TC BOOST SENSOR

DTC Logic

INFOID:000000006466512

DTC DETECTION LOGIC

NOTE:

If DTC P012B is displayed with DTC P0470, first perform the trouble diagnosis for DTC P0470.

Refer to [EC-1406, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P012B	TC INLET PRESSURE SEN (High Pressure air circuit)	When intake air from mass air flow sensor signal is higher than specification value for 9 seconds or more.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor • Turbocharger • Turbocharger boost sensor • Intake air leaks • Charge air cooler • Exhaust gas pressure sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep engine speed more than 3,000 rpm for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1358, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466513

1. CHECK INTAKE AIR SYSTEM

1. Check air cleaner for clogging.
2. Check the air duct for connection and cracks.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

3. CHECK TURBOCHARGER

Check if foreign matter is caught between the turbocharger. Refer to [EM-348, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Remove the foreign matter and clean the turbocharger. Refer to [EM-348, "Exploded View"](#).

4. CHECK MASS AIR FLOW SENSOR

P012B TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Check mass air flow sensor and circuit. Refer to [EC-1345, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK INSTALLATION CONDITION OF TURBOCHARGER BOOST SENSOR

Check the installation condition of turbocharger boost sensor.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Install turbocharger boost sensor definitely.

6.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1359, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

7.CHECK CONNECTION OF EXHAUST GAS PRESSURE SENSOR 1 HARNESS CONNECTOR

Check the connection of exhaust gas pressure sensor 1 harness connector.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Reconnect exhaust gas pressure sensor 1 harness connector definitely.

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000006466514

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Start the engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E207	39 (Turbocharg- er boost sen- sor signal)	17 (Sensor ground)	Idle (Engine is warmed-up to normal operating temperature.)	1.3 V
			Idle to about 2,000 rpm	1.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0130 A/F SENSOR 1

DTC Logic

INFOID:000000006466515

DTC DETECTION LOGIC

NOTE:

If DTC P0130 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0130	A/F SENSOR 1 [Air fuel ratio (A/F) sensor circuit]	A/F signal computed by ECM from the A/F sensor signal is out of the specified range.	• Harness or connectors (A/F sensor circuit is shorted.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine at about 3,000 rpm for about 3 minutes under no load.
2. Let it idle at least 1 minute.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1360, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466516

1. CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		–	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between A/F sensor harness connector and ECM relay harness connector.

+		-		Continuity
A/F sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F67	4	E214	5	Existed

P0130 A/F SENSOR 1

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	1	E207	32	Existed
	2		10	
	5		33	
	6		11	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-II

1. Check the continuity between A/F sensor harness connector and ground.

+		-	Continuity
A/F sensor			
Connector	Terminal		
F67	1	Ground	Not existed
	2		
	5		
	6		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-III

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	10	Ground	Not existed
	11		
	32		
	33		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning parts.

7. REPLACE A/F SENSOR

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0131 A/F SENSOR 1

DTC Logic

INFOID:000000006466517

DTC DETECTION LOGIC

NOTE:

If DTC P0131 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 [Air fuel ratio (A/F) sensor circuit]	A/F signal computed by ECM from the A/F sensor signal is out of the specified range.	• Harness or connectors (A/F sensor circuit is shorted.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1363, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466518

1. CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		-	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between A/F sensor harness connector and ECM relay harness connector.

+		-		Continuity
A/F sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F67	3	E214	5	Existed

4. Also check harness for short to ground and to power.

P0131 A/F SENSOR 1

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	1	E207	32	Existed
	2		10	
	5		33	
	6		11	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-II

1. Check the continuity between A/F sensor harness connector and ground.

+		-	Continuity
A/F sensor			
Connector	Terminal		
F67	1	Ground	Not existed
	2		
	5		
	6		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-III

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	10	Ground	Not existed
	11		
	32		
	33		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

6.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning parts.

7.REPLACE A/F SENSOR

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0133 A/F SENSOR 1

DTC Logic

INFOID:000000006466519

DTC DETECTION LOGIC

NOTE:

If DTC P0133 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0133	A/F SENSOR1 [Air fuel ratio (A/F) sensor circuit]	Response of the A/F signal computed by ECM from the A/F sensor signal is out of the specified range.	• Harness or connectors (A/F sensor circuit is shorted.) • A/F sensor

Diagnosis Procedure

INFOID:000000006466520

1.CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		-	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between A/F sensor harness connector and ECM relay harness connector.

+		-		Continuity
A/F sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F67	4	E214	5	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	1	E207	32	Existed
	2		10	
	5		33	
	6		11	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-II

1. Check the continuity between A/F sensor harness connector and ground.

+		-	Continuity
A/F sensor			
Connector	Terminal		
F67	1	Ground	Not existed
	2		
	5		
	6		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-III

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	10	Ground	Not existed
	11		
	32		
	33		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning parts.

7.REPLACE A/F SENSOR

P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P0134 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0134 A/F SENSOR 1

DTC Logic

INFOID:000000006466521

DTC DETECTION LOGIC

NOTE:

If DTC P0134 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.
Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0134	A/F SENSOR1 [Air fuel ratio (A/F) sensor circuit]	A/F signal computed by ECM from the A/F sensor signal is out of the specified range.	• Harness or connectors (A/F sensor circuit is shorted.) • A/F sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine at about 3,000 rpm for about 3 minutes under no load.
2. Let it idle at least 1 minute.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1369, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466522

1. CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		-	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between A/F sensor harness connector and ECM relay harness connector.

+		-		Continuity
A/F sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F67	4	E214	5	Existed

P0134 A/F SENSOR 1

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	1	E207	32	Existed
	2		10	
	5		33	
	6		11	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-II

1. Check the continuity between A/F sensor harness connector and ground.

+		-	Continuity
A/F sensor			
Connector	Terminal		
F67	1	Ground	Not existed
	2		
	5		
	6		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-III

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	10	Ground	Not existed
	11		
	32		
	33		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.

P0134 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace malfunctioning parts.

7.REPLACE A/F SENSOR

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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P0135 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0135 A/F SENSOR 1 HEATER

DTC Logic

INFOID:000000006466523

DTC DETECTION LOGIC

NOTE:

If DTC P0110 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0135	A/F SEN1 HTR [Air fuel ratio (A/F) sensor heater circuit]	Current amperage in A/F sensor heater circuit is out of the normal range. (An excessively low or high voltage signal is sent to ECM through the A/F sensor heater)	• Harness or connectors (A/F sensor heater circuit is open or shorted.) • A/F sensor heater

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a 6 minutes in the suitable gear position.
3. Release accelerator pedal for at least 3 seconds.

CAUTION:

Do not depress brake pedal during this procedure.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1372, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466524

1. CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		–	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK A/F SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between A/F sensor harness connector and ECM relay harness connector.

P0135 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
A/F sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F67	4	E214	5	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	3	E207	51	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK A/F SENSOR HEATER

Check A/F sensor heater. Refer to [EC-1373, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

5.REPLACE A/F SENSOR

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

Component Inspection

INFOID:000000006466525

CAUTION:

- Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

1.CHECK AIR FUEL RATIO (A/F) SENSOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Check the resistance between A/F sensor terminals.

P0135 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Resistance
A/ F sensor			
Terminal			
3		4	2.4 - 4.0 Ω [at 25°C (77°F)]
		1	$\infty \Omega$ (Continuity should not exist)
		2	
4		1	
		2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning air fuel ratio (A/F) sensor. Refer to [EM-311. "Exploded View"](#).

P0180 FUEL TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0180 FUEL TEMPERATURE SENSOR

DTC Logic

INFOID:000000006466526

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0180	FUEL TEMP SENSOR (Fuel temperature sensor circuit)	- ECM detects open circuit of fuel temperature sensor circuit for 1 second or more. - ECM detects short circuit to power supply of fuel temperature sensor circuit for 1 second or more. - ECM detects short circuit to ground of fuel temperature sensor circuit for 1 second or more.	- Harness or connectors (Fuel temperature sensor circuit is open or shorted.) - Fuel temperature sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1375, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466527

1. CHECK FUEL TEMPERATURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect fuel temperature sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel temperature sensor harness connector terminals.

Fuel temperature sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F85	1	2	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK FUEL TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between fuel temperature sensor harness connector and ground.

+		-	Voltage (Approx.)
Fuel temperature sensor			
Connector	Terminal		
F85	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

P0180 FUEL TEMPERATURE SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3.CHECK FUEL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel temperature sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F85	1	F62	101	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel temperature sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel temperature sensor		ECM		
Connector	Terminal	Connector	Terminal	
F85	2	F62	102	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK FUEL TEMPERATURE SENSOR

Check fuel temperature sensor. Refer to [EC-1376, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace fuel tube assembly. Refer to [EM-315, "Exploded View"](#).

Component Inspection

1.CHECK FUEL TEMPERATURE SENSOR

INFOID:000000006466528

P0180 FUEL TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

1. Turn ignition switch OFF.
2. Disconnect fuel temperature sensor.
3. Check the resistance between fuel temperature sensor terminals.

+	−	Resistance
Fuel temperature sensor		
Terminal		
1	2	77 Ω - 57 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel tube assembly. Refer to [EM-315, "Exploded View"](#).

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P0190 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0190 FRP SENSOR

DTC Logic

INFOID:000000006466529

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FRP SENSOR (Fuel rail pressure sensor circuit)	- ECM detects open circuit of fuel rail pressure sensor circuit for 0.2 second or more. - ECM detects short circuit to power supply of fuel rail pressure sensor circuit for 0.2 second or more. - ECM detects short circuit to ground of fuel rail pressure sensor circuit for 0.2 second or more. - Fuel rail pressure sensor voltage to ECM is 0.3 V or less 0.7 V or more when engine started or after ignition switch OFF for 0.1 second or more.	- Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) - Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1378, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- Start the engine and let it idle and wait at least 1 second.
- Turn ignition switch OFF and wait at least 4 minutes.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1378, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466530

1.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect fuel rail pressure sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel rail pressure sensor harness connector terminals.

Fuel rail pressure sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F260	3	1	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

P0190 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY-II

Check the voltage between fuel rail pressure sensor harness connector and ground.

+		-	Voltage (Approx.)
Fuel rail pressure sensor			
Connector	Terminal		
F260	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel rail pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F260	3	F62	133	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel rail pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F260	1	F62	149	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0190 FRP SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

6.CHECK FUEL RAIL PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Fuel rail pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F260	2	F62	134	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK FOR FUEL LEAK

1. Start the engine.
2. Visually check the following for fuel leak.
 - Fuel line from fuel pump to fuel rail
 - Fuel rail
 - Fuel line from fuel rail to fuel injector

Is fuel leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 8.

8.CHECK FUEL RAIL PRESSURE SENSOR

Check fuel rail pressure sensor. Refer to [EC-1380, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace fuel rail (bank 1 side) assembly. Refer to [EM-315, "Exploded View"](#).

Component Inspection

INFOID:000000006466531

1.CHECK FUEL RAIL PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode of "ENGINE" with CONSULT-III.
5. Check that the "FUEL RAIL PRES" indication.

Is the value lower than 250 bar?

YES >> INSPECTION END

NO >> Replace fuel rail (bank 1 side) assembly. Refer to [EM-315, "Exploded View"](#).

P0195 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0195 EOT SENSOR

DTC Logic

INFOID:000000006466532

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0195	EOT SENSOR (Engine oil temperature sensor circuit)	- ECM detects open circuit of engine oil temperature sensor circuit for 1 second or more. - ECM detects short circuit to power supply of engine oil temperature sensor circuit for 1 second or more. - ECM detects short circuit to ground of engine oil temperature sensor circuit for 1 second or more.	- Harness or connectors (Engine oil temperature sensor circuit is open or shorted) - Engine oil temperature/level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1381, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466533

1.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect engine oil temperature/level sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between engine oil temperature/level sensor harness connector terminals.

Engine oil temperature/level sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F81	1	2	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between engine oil temperature/level sensor harness connector and ground.

+		-	Voltage (Approx.)
Engine oil temperature/level sensor			
Connector	Terminal		
F81	1	Ground	5 V

Is the inspection result normal?

P0195 EOT SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil temperature/level sensor harness connector and ECM harness connector.

+		-		Continuity
Engine oil temperature/level sensor		ECM		
Connector	Terminal	Connector	Terminal	
F81	1	F62	115	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil temperature/level sensor harness connector and ECM harness connector.

+		-		Continuity
Engine oil temperature/level sensor		ECM		
Connector	Terminal	Connector	Terminal	
F81	2	F62	100	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Repair or replace error-detected parts.

6.CHECK ENGINE OIL TEMPERATURE SENSOR

Check engine oil temperature/level sensor. Refer to [EC-1383, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0195 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace engine oil temperature/level sensor. Refer to [EM-320, "Exploded View"](#).

Component Inspection

INFOID:000000006466534

1.CHECK ENGINE OIL TEMPERATURE/LEVEL SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature/level sensor harness connector.
3. Remove engine oil temperature/level sensor. Refer to [EM-320, "Exploded View"](#).
4. Check the resistance between engine oil temperature/level sensor terminals.

+	—	Resistance
Engine oil temperature/level sensor		
Terminals		
1	2	100 Ω - 10 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature/level sensor. Refer to [EM-320, "Exploded View"](#).

P0200, P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0200, P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

DTC Logic

INFOID:000000006466535

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0200	INJECTOR (Fuel injector circuit)	- ECM detects short circuit to power supply of fuel injector circuit for 1 second or more. - ECM detects short circuit to ground of fuel injector circuit for 1 second or more. - ECM detects short circuit to between fuel injector circuits for 1 second or more.	- Harness or connectors (Fuel injector circuits is open or shorted.) - Fuel injectors
P0201	CYL 1 INJECTOR (NO. 1 cylinder fuel injector circuit)	- ECM detects short circuit between fuel injector circuits for 2 seconds or more while running the engine at idle speed. - ECM detects open circuit of fuel injector circuit for 2 seconds or more while running the engine at idle speed. - ECM detects fuel injector dose not actuated for 4 seconds or more while running the engine at idle speed.	
P0202	CYL 2 INJECTOR (NO. 2 cylinder fuel injector circuit)		
P0203	CYL 3 INJECTOR (NO. 3 cylinder fuel injector circuit)		
P0204	CYL 4 INJECTOR (NO. 4 cylinder fuel injector circuit)		
P0205	CYLINDER 5 INJECTOR (NO. 5 cylinder fuel injector circuit)		
P0206	CYLINDER 6 INJECTOR (NO. 6 cylinder fuel injector circuit)		

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1384, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466536

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect fuel injector harness connector.
- Check the continuity between the following terminals corresponding to the malfunctioning cylinder.

P0200, P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+			-		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F64	1	F62	110	Existed
2	F70	1		126	
3	F65	1		111	
4	F71	1		127	
5	F66	1		112	
6	F72	1		125	

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.

+			-		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F64	2	F62	95	Existed
2	F70	2		141	
3	F65	2		96	
4	F71	2		142	
5	F66	2		97	
6	F72	2		140	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL INJECTOR CIRCUIT FOR SHORT

Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.

Fuel injector				Continuity
Cylinder	Connector	+	—	
		Terminal		
1	F64	1	2	Not existed
2	F70	1	2	
3	F65	1	2	
4	F71	1	2	
5	F66	1	2	
6	F72	1	2	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL INJECTOR-I

P0200, P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Check fuel injector. Refer to [EC-1386, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-316, "Removal and Installation"](#).

5.CHECK FUEL INJECTOR-II

1. Remove two fuel injectors. Refer to [EM-316, "Removal and Installation"](#).

NOTE:

One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.

2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform "Injector Adjustment Value Registration". Refer to [EC-1316, "Work Procedure"](#).
6. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
7. Perform DTC confirmation procedure again. Refer to [EC-1384, "DTC Logic"](#).

Is DTC displayed for the other cylinder?

YES >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-316, "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Component Inspection (Fuel Injector)

INFOID:000000006466537

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

+	−	Resistance
Fuel injector		
Terminal		
1	2	150 - 210 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-316, "Removal and Installation"](#).

P0225 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0225 APP SENSOR

DTC Logic

INFOID:000000006466538

DTC DETECTION LOGIC

NOTE:

If DTC P0225 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641.

Refer to [EC-1446, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0225	APP SENSOR 1 (Accelerator pedal position sensor 1 circuit)	- ECM detects open circuit of APP sensor 1 circuit for 0.3 second or more when accelerator pedal is depressed. - ECM detects short circuit to power supply of APP sensor 1 circuit for 0.3 second or more when accelerator pedal is depressed. - ECM detects short circuit to ground of APP sensor 1 circuit for 0.3 second or more when accelerator pedal is depressed. - Correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range for 0.5 second or more when accelerator pedal is depressed.	- Harness or connectors (APP sensor 1 circuit is open or shorted.) - APP sensor (1 and 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Fully depress the accelerator pedal.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1387, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466539

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect accelerator pedal position sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between accelerator pedal position sensor harness connector terminals.

Accelerator pedal position sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
E108	2	4	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY-II

Check the voltage between accelerator pedal position sensor harness connector and ground.

P0225 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E108	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	2	E207	81	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	4	E207	79	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0225 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	3	E207	57	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check accelerator pedal position sensor. Refer to [EC-1389, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000006466540

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	Terminal				
	+	−			
E207	57 (APP sensor 1)	79	Accelerator pedal	Fully released	0.7 V
				Fully depressed	4.5 V
	58 (APP sensor 2)	80		Fully released	0.3 V
				Fully depressed	2.2 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

P0235 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0235 TC BOOST SENSOR

DTC Logic

INFOID:000000006466541

DTC DETECTION LOGIC

NOTE:

- If DTC P0235 is displayed, Check turbocharger so that there is possibility of the malfunction of turbocharger.
- If DTC P0235 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641. Refer to [EC-1446, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0235	TC BOOST SENSOR (Turbocharger boost sensor circuit)	• ECM detects open circuit of turbocharger boost sensor circuit for 0.4 second or more. • ECM detects short circuit to power supply of turbocharger boost sensor circuit for 0.4 second or more. • ECM detects short circuit to ground of turbocharger boost sensor circuit for 0.4 second or more. • Difference of turbocharger boost sensor value and barometric pressure sensor value is 160 hPa or less for 2 seconds or more when ignition switch ON. • Difference of turbocharger boost sensor value and barometric pressure sensor value is 200 hPa or less for 10 seconds or more while running the engine at idle speed.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor • Barometric pressure sensor (built into the ECM)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1390, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and keep the engine speed at 1,000 rpm for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1390, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466542

1. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

P0235 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Turbocharger boost sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
E206	1	2	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY-II

Check the voltage between turbocharger boost sensor harness connector and ground.

+		-	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
E206	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	1	F62	151	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	3	E207	17	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0235 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6. CHECK TURBOCHARGER BOOST SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	2	E207	39	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1392, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> Replace ECM (Barometric pressure sensor). Refer to [EC-1541, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000006466543

1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Start the engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
E207	39 (Turbocharg- er boost sen- sor signal)	17 (Sensor ground)	Idle (Engine is warmed-up to normal operating temperature.)	1.3 V
			Idle to about 2,000 rpm	1.4 V

Is the inspection result normal?

P0235 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

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P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0335 CKP SENSOR

DTC Logic

INFOID:000000006466544

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SENSOR (Crankshaft position sensor circuit)	- ECM cannot detect crankshaft position sensor signal when engine started. - Crankshaft position sensor signal is not in the normal pattern when engine started.	- Harness or connectors (CKP sensor circuit is open or shorted.) - Crankshaft position sensor - Signal plate with drive plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1394, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466545

1.CHECK CRANKSHAFT POSITION SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect crankshaft position (CKP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between CKP sensor harness connector terminals.

CKP sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
F80	1	2	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK CKP SENSOR POWER SUPPLY-II

Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F80	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

P0335 CKP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

3.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

+		-		Continuity
CKP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F80	1	F62	152	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

+		-		Continuity
CKP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F80	2	F62	137	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK CKP SENSOR

Check CKP sensor. Refer to [EC-1396, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace CKP sensor. Refer to [EC-1228, "Component Parts Location"](#).

7.CHECK SIGNAL PLATE WITH DRIVE PLATE

Visually check for chipping signal plate with drive plate.

Is the inspection result normal?

P0335 CKP SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 8.
NO >> Replace signal plate with drive plate. Refer to [EM-377, "Exploded View"](#).

8.CHECK TIMING CHAIN

Check timing chain. Refer to [EM-323, "Removal and Installation"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace timing chain. Refer to [EM-323, "Removal and Installation"](#).

Component Inspection (Crankshaft Position Sensor)

INFOID:000000006466546

1.CHECK CRANKSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Check the resistance between CKP sensor terminals.

+	−	Resistance
CKP sensor		
Terminal		
1	2	600 - 1 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CKP sensor. Refer to [EC-1228, "Component Parts Location"](#).

P0340 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0340 CMP SENSOR

DTC Logic

INFOID:000000006466547

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SENSOR (Camshaft position sensor circuit)	- ECM cannot detect camshaft position sensor signal while running the engine at idle speed. - Camshaft position sensor signal is not in the normal pattern while running the engine at idle speed.	- Harness or connectors (Camshaft position sensor circuit is open or shorted.) - Camshaft position sensor - Signal plate of camshaft rear end (bank 2 intake side)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1397, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466548

1. CHECK CAMSHAFT POSITION SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect camshaft position (CMP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between CMP sensor harness connector and ground.

CMP sensor			Voltage
Connector	+	-	
	Terminal		
F73	3	1	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK CMP SENSOR POWER SUPPLY-II

Check the voltage between CMP sensor harness connector and ground.

+		-	Voltage
CMP sensor			
Connector	Terminal		
F73	3	Ground	Battery voltage

P0340 CMP SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between CMP sensor harness connector and ECM relay harness connector.

+		-		Continuity
CMP sensor		ECM relay		
Connector	Terminal	Connector	Terminal	
F73	3	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK CAMSHAFT POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

+		-		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	1	E207	45	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Repair or replace error-detected parts.

6.CHECK CMP SENSOR SIGNAL CIRCUIT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

+		-		Continuity
CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	2	E207	46	Existed

P0340 CMP SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK CMP SENSOR

Check CMP sensor. Refer to [EC-1399, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace CMP sensor. Refer to [EM-363, "Exploded View"](#).

8.CHECK CAMSHAFT RH (BANK 2)

Visually check for chipping camshaft RH (bank 2).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace camshaft RH (bank 2). Refer to [EM-363, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000006466549

1.CHECK CAMSHAFT POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Check the resistance between CMP sensor terminals.

+	−	Resistance
CMP sensor		
Terminal		
2	3	9.0 - 11.0 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CMP sensor. Refer to [EM-363, "Exploded View"](#).

P0380 GLOW RELAY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0380 GLOW RELAY

DTC Logic

INFOID:000000006466550

DTC DETECTION LOGIC

NOTE:

- If DTC P0380 is displayed with DTC P0670, first perform the trouble diagnosis for DTC P0670. Refer to [EC-1450, "DTC Logic"](#).
- If DTC P0380 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685. Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0380	GLOW RELAY (Glow control unit circuit)	• An improper voltage signal is sent to ECM from glow control unit for 6 seconds or more when glow control system is functioning. • ECM is not detected signal from glow control unit for 4 seconds or more when glow control system is functioning.	• Harness or connectors - (Glow plug control circuit is open or shorted.) - (Glow control unit input signal circuit is open or shorted.) • Glow plug • Glow control unit

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Check that the engine coolant temperature is 20°C (68°F) or less.

NOTE:

If engine coolant temperature is above 20°C (68°F), cool down the engine and then go to the next step.

2. Start the engine and let it idle at least 10 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1400, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466551

1. CHECK GLOW CONTROL UNIT POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect glow control unit harness connector.
3. Check the voltage between glow control unit harness connector and ground.

+		-	Voltage
Glow control unit			
Connector	Terminal		
F61	10	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2. CHECK GLOW CONTROL UNIT POWER SUPPLY-II

1. Turn ignition switch ON.
2. Check the voltage between glow control unit harness connector and ground.

P0380 GLOW RELAY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		–	Voltage
Glow control unit			
Connector	Terminal		
F61	11	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK GLOW CONTROL UNIT POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
- Check the continuity between glow control unit harness connector and ECM relay harness connector.

+		-		Continuity
Glow control unit		ECM relay		
Connector	Terminal	Connector	Terminal	
F61	11	E214	5	Existed

- Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK GLOW CONTROL UNIT GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
Glow control unit		ECM		
Connector	Terminal	Connector	Terminal	
F61	9	E207	14	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK GLOW CONTROL UNIT SIGNAL CIRCUIT

- Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
Glow control unit		ECM		
Connector	Terminal	Connector	Terminal	
F61	7	E207	50	Existed
	8		74	

- Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK GLOW PLUG CONTROL CIRCUIT

- Disconnect glow plug harness connector.
- Check the continuity between glow control unit harness connector and glow plug harness connector.

P0380 GLOW RELAY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Cylinder	+		-		Continuity
	Glow control unit		Glow plug		
	Connector	Terminal	Connector	Terminal	
1	F61	1	F251	1	Existed
2		2	F252	1	
3		3	F253	1	
4		4	F254	1	
5		5	F255	1	
6		6	F256	1	

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK GLOW PLUG

Check glow plug. Refer to [EC-1402, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace glow plug of malfunctioning cylinder. Refer to [EM-313, "Removal and Installation"](#).

8.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> Replace glow control unit. Refer to [EC-1228, "Component Parts Location"](#).

NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:000000006466552

NOTE:

- Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.
- If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.
- Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plug harness connector.
3. Check the resistance between glow plug terminal and engine ground.

+	-	Condition	Resistance
Glow plug			
Terminal			
1	Engine ground	20°C (68°F)	0.1 - 1.0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning glow plug. Refer to [EC-1228, "Component Parts Location"](#).

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:000000006466553

DTC DETECTION LOGIC

NOTE:

If DTC P0409 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0409	EGR POS SENSOR (EGR volume control valve position sensor circuit)	- ECM detects open circuit of EGR volume control valve position sensor circuit for 0.4 second or more. - ECM detects short circuit to power supply of EGR volume control valve position sensor circuit for 0.4 second or more. - ECM detects short circuit to ground of EGR volume control valve position sensor circuit for 0.4 second or more.	- Harness or connectors (EGR volume control valve position sensor circuit is open or shorted.) - EGR volume control valve position sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1403, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466554

1. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect EGR volume control valve harness connector.
- Turn ignition switch ON.
- Check the voltage between EGR volume control valve harness connector terminals.

EGR volume control valve			Voltage (Approx.)
Connector	+	−	
	Terminal		
F9	1	3	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY-II

Check the voltage between EGR volume control valve harness connector and ground.

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage (Approx.)
EGR volume control valve			
Connector	Terminal		
F9	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

+		-		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F9	1	E207	40	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

+		-		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F9	3	F62	150	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.

P0409 EGR VOLUME CONTROL VALVE POSITION SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- Disconnect ECM harness connector.
- Check the continuity between EGR volume control valve harness connector and ECM harness connector.

+		-		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F9	5	F62	135	Existed

- Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR

Check EGR volume control valve position sensor. Refer to [EC-1405, "Component Inspection \(EGR Volume Control Valve Position Sensor\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

Component Inspection (EGR Volume Control Valve Position Sensor)

INFOID:000000006466555

1.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR

- Turn ignition switch OFF.
- Start the engine and warm it up to normal operating temperature.
- Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
F62	135 (sensor signal)	150 (sensor ground)	[Engine is running] • Warm-up condition • Idle speed	3.0 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

P0470 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0470 EXHAUST GAS PRESSURE SENSOR 1

DTC Logic

INFOID:000000006466556

DTC DETECTION LOGIC

NOTE:

- If DTC P0470 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641. Refer to [EC-1446, "DTC Logic"](#).
- If DTC P0470 is displayed with DTC P012B or DTC P2263, perform the trouble diagnosis for DTC P012B or DTC P2263. Refer to [EC-1358, "DTC Logic"](#) or [EC-1481, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0470	EXH GAS PRESS SEN (Exhaust gas pressure sensor 1 circuit)	• ECM detects open circuit of exhaust gas pressure sensor 1 circuit for 1.1 seconds or more. • ECM detects short circuit to power supply of exhaust gas pressure sensor 1 circuit for 11 seconds or more. • ECM detects short circuit to ground of exhaust gas pressure sensor 1 circuit for 1.1 seconds or more. • ECM detects open circuit of ground in exhaust gas pressure sensor 1 circuit for 6 seconds or more while running the engine.	• Harness or connectors (Exhaust gas pressure sensor 1 circuit is open or shorted.) • Exhaust gas pressure sensor 1 • Exhaust gas pressure sensor 1 pipe installed incorrectly. • Turbocharger

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 15 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1406, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1406, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466557

1. CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect exhaust gas pressure sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas pressure sensor 1 harness connector terminals.

P0470 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Exhaust gas pressure sensor 1			Voltage (Approx.)
Connector	+	–	
	Terminal		
F69	3	1	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY-II

Check the voltage between exhaust gas pressure sensor 1 harness connector and ground.

+		-	Voltage (Approx.)
Exhaust gas pressure sensor 1			
Connector	Terminal		
F69	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK EXHAUST GAS PRESSURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F69	3	F62	120	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS PRESSURE SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F69	1	F62	132	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0470 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST GAS PRESSURE SENSOR 1 SIGNAL CIRCUIT

1. Check the continuity between exhaust gas pressure sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas pressure sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F69	2	F62	131	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK EXHAUST GAS PRESSURE SENSOR 1

Check exhaust gas pressure sensor 1. Refer to [EC-1409, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace exhaust gas pressure sensor 1. Refer to [EM-348, "Exploded View"](#).

8.CHECK EXHAUST GAS PRESSURE SENSOR 1 PIPE INSTALLATION CONDITION VISUALLY

Check exhaust gas pressure sensor 1 pipe installation condition.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning parts.

9.CHECK EXHAUST GAS PRESSURE SENSOR 1 PIPE

1. Remove exhaust gas pressure sensor 1 pipe. Refer to [EM-348, "Exploded View"](#).
2. Check if foreign matter is caught between the exhaust gas pressure sensor 1 pipe.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Remove the foreign matter and clean the exhaust gas pressure sensor 1 pipe. Refer to [EM-348, "Exploded View"](#).

10.CHECK TURBOCHARGER

Check turbocharger. Refer to [EM-348, "Exploded View"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace malfunctioning parts.

P0470 EXHAUST GAS PRESSURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Component Inspection

INFOID:000000006466558

1.CHECK EXHAUST GAS PRESSURE SENSOR 1

1. Start the engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
F62	131 (Exhaust gas pressure sen- sor 1 signal)	132 (Sensor ground)	Idle (Engine is warmed-up to normal operating temperature.)	0.8 V
			Idle to about 2,000 rpm	1.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas pressure sensor 1. Refer to [EM-348, "Exploded View"](#).

P0487 EGR VOLUME CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:000000006466559

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0487	EGR CONT VALVE (EGR volume control valve circuit)	- EGR volume control valve circuit current is higher than specification value for 0.5 second or more when EGR volume control valve is actuated. - ECM detects open circuit of EGR volume control valve circuit after ignition switch OFF. - ECM detects short circuit to power supply of EGR volume control valve circuit for 0.5 second or more when EGR volume control valve is actuated. - ECM detects short circuit to ground of EGR volume control valve circuit for 0.5 second or more when EGR volume control valve is actuated. - ECM detects short circuit between EGR volume control valve circuits for 0.5 second or more when EGR volume control valve is actuated. - ECM detects short circuit to power supply of EGR volume control valve circuit after ignition switch OFF. - ECM detects EGR volume control valve is not actuated for 0.5 second or more.	- Harness or connectors (EGR volume control valve motor circuit is open or shorted.) - EGR volume control valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 1 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1410, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start the engine and let it idle at least 5 seconds.
- Turn ignition switch OFF.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1410, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466560

1. CHECK EGR VOLUME CONTROL VALVE DC MOTOR CIRCUIT

- Turn ignition switch OFF.
- Disconnect EGR volume control valve harness connector.

P0487 EGR VOLUME CONTROL VALVE

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

3. Disconnect ECM harness connector.
4. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

+		-		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F9	2	F62	143	Existed
			144	Not existed
	6		143	Not existed
			144	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK EGR VOLUME CONTROL VALVE

Check EGR volume control valve. Refer to [EC-1411, "Component Inspection \(EGR Volume Control Valve\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

Component Inspection (EGR Volume Control Valve)

INFOID:000000006466561

1.CHECK EGR VOLUME CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check the resistance between EGR volume control valve terminals.

+	−	Resistance
EGR volume control valve		
Terminal		
2	6	8.0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

P0488 EGR SYSTEM

DTC Logic

INFOID:000000006466562

NOTE:

If DTC P0488 is displayed with DTC P0606 or DTC P060C, perform the trouble diagnosis for DTC P0606 or DTC P060C.

Refer to [EC-1440, "DTC Logic"](#) or [EC-1442, "DTC Logic"](#).

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0488	EGR SYSTEM (EGR volume control valve function)	- Correlation between absolute position and specification position is inconsistency during off-set learning. - EGR volume control valve closed position learning is not completed 3 times consecutively during off-set learning. - After warming up condition, ECM detects EGR volume control valve is stuck closed or stuck open for 5.6 seconds while the EGR operation.	- Harness or connectors (EGR volume control valve control motor circuit is open or shorted.) - EGR volume control valve - EGR volume control valve stuck closed - EGR bypass is clogging

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 20 seconds.
- Check 1st trip DTC.

TESTING CONDITION

Always perform test at intake air temperature of 5°C (41°F) or more.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1413, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Turn ignition switch OFF and wait at least 4 minutes.
- Turn ignition switch ON and wait at least 20 seconds.
- Repeat steps 1 and 2 for three times.

TESTING CONDITION

Always perform test at intake air temperature of 5°C (41°F) or more.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1413, "Diagnosis Procedure"](#).

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-III

- Start the engine and let it idle at least 20 seconds.
- Check 1st trip DTC.

TESTING CONDITION

Always perform test at intake air temperature of 5°C (41°F) or more.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1413, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466563

1.CHECK EGR VOLUME CONTROL VALVE OPERATION

1. Turn ignition switch ON.
2. Turn ignition switch OFF.
3. Check that EGR volume control valve operates.several times after turn ignition switch OFF.

NOTE:

Repeat several times opening and shutting after ignition switch OFF.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

2.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve. Refer to [EM-358, "Exploded View"](#).
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Remove the foreign matter and clean the EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

3.CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace EGR passage. Refer to [EM-358, "Exploded View"](#).

4.CHECK EGR VOLUME CONTROL VALVE

Check EGR volume control valve. Refer to [EC-1414, "Component Inspection \(EGR Volume Control Valve\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

5.CHECK EGR VOLUME CONTROL VALVE DC MOTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

+		-		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F9	2	F62	143	Existed
			144	Not existed
	6		143	Not existed
			144	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR

P0488 EGR SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Check EGR volume control valve. Refer to [EC-1414, "Component Inspection \(EGR Volume Control Valve Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

Component Inspection (EGR Volume Control Valve)

INFOID:000000006466564

1.CHECK EGR VOLUME CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check the resistance between EGR volume control valve terminals.

+	−	Resistance
EGR volume control valve		
Terminal		
2	6	8.0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

Component Inspection (EGR Volume Control Valve Position Sensor)

INFOID:000000006466565

1.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR

1. Turn ignition switch OFF.
2. Start the engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
F62	135 (sensor signal)	150 (sensor ground)	[Engine is running] • Warm-up condition • Idle speed	3.0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR volume control valve. Refer to [EM-358, "Exploded View"](#).

P0500 VSS

Description

INFOID:000000006466566

The vehicle speed signal is sent to the ECM from the "ABS actuator and electric unit (control unit)" by CAN communication line.

DTC Logic

INFOID:000000006466567

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	Vehicle speed signal	Vehicle speed signal is more than the specified range for 1 second or more while running the engine.	• Harness or connectors - (CAN communication line is open or shorted) - (Vehicle speed signal circuit is open or shorted) • Vehicle speed sensor • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1415, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466568

1. CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Perform the trouble diagnosis for CAN communication system. Refer to [LAN-14, "Trouble Diagnosis Flow Chart"](#).

2. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Check the self-diagnosis result of ABS actuator and electric unit (control unit) with CONSULT-III. Refer to [BRC-19, "CONSULT Functions"](#).

Is any DTC detected?

- YES >> Perform trouble diagnosis of detected DTC.
 NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0525 ASCD SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0525 ASCD SYSTEM

DTC Logic

INFOID:000000006466569

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Possible cause
P0525	ASCD FUNCTION • (ASCD brake switch circuit) • (ASCD clutch pedal position switch circuit)	• Harness or connectors - (ASCD brake switch circuit is open or shorted.) - (ASCD clutch switch circuit is open or shorted.) • ASCD brake switch • ASCD clutch switch

Diagnosis Procedure

INFOID:000000006466570

1.CHECK ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" with CONSULT-III.
3. Check that the "BPP SW" indication as per the following condition.

Monitor item	Condition		Indication
BPP SW	Brake pedal	Fully released	RELSD
		Slightly depressed	PRSSD

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

+		−	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
E207	86	Ground	Brake pedal	Fully released	Battery voltage
				Slightly depressed	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connectors.
3. Check the voltage between ASCD brake switch and ground.

+		-	Voltage
ASCD brake switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ASCD BRAKE SWITCH SIGNAL CIRCUIT

P0525 ASCD SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

1. Disconnect ECM harness connector.
2. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

+		-		Continuity
ASCD brake switch		ECM		
Connector	Terminal	Connector	Terminal	
E110	2	E207	86	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH

Check ASCD brake switch. Refer to [EC-1417, "Component Inspection \(ASCD Brake Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD brake switch. Refer to [BR-5, "Inspection and Adjustment"](#).

Component Inspection (ASCD Brake Switch)

INFOID:000000006466571

1.CHECK ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch			Condition		Continuity
Connector	+	−			
	Terminal				
E110	1	2	Brake pedal	Depressed	Not existed
				Released	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to [BR-5, "Inspection and Adjustment"](#).

P0527 COOLING FAN SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0527 COOLING FAN SPEED SENSOR

DTC Logic

INFOID:000000006466572

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0527	Cooling fan speed sensor circuit range/performance	The number of fan speed signals is 16 rpm or less during engine rev.	• Harness or connectors (The Electrically-controlled cooling fan coupling circuit is open or shorted) • Cooling fan speed sensor • Electrically-controlled cooling fan coupling • Cooling fan • IPDM E/R

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Keep the engine speed approximately 1,000 rpm at no load.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1418, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466573

1. CHECK COOLING FAN SPEED SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect electrically-controlled cooling fan coupling harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electrically-controlled cooling fan coupling harness connector terminals.

Electrically-controlled cooling fan coupling			Voltage (Approx.)
Connector	+	−	
	terminal		
F83	2	4	5 V

Is inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 2.

2. CHECK COOLING FAN SPEED SENSOR POWER SUPPLY CIRCUIT-II

1. Check the voltage between electrically-controlled cooling fan coupling harness connector and the ground.

P0527 COOLING FAN SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage (Approx.)
Electrically-controlled cooling fan coupling			
Connector	terminal		
F83	2	Ground	5 V

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK COOLING FAN SPEED SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electrically-controlled cooling fan coupling harness connector and ECM harness connector.

+		-		Continuity
Electrically-controlled cooling fan coupling		ECM		
Connector	Terminal	Connector	Terminal	
F83	4	E207	23	Existed

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and the ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

5.CHECK COOLING FAN SPEED SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electrically-controlled cooling fan coupling harness connector and ECM harness connector.

+		-		Continuity
Electrically-controlled cooling fan coupling		ECM		
Connector	Terminal	Connector	Terminal	
F83	5	E207	67	Existed

P0527 COOLING FAN SPEED SENSOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK COOLING FAN SPEED SENSOR

1. Reconnect all harness connectors disconnected.

2. Perform cooling fan speed sensor component inspection. Refer to [EC-1420, "Component Inspection \(Cooling Fan Speed Sensor\)"](#).

Is inspection result normal?

YES >> GO TO 7.

NO >> Replace electrically-controlled cooling fan coupling. Refer to [CO-73, "Removal and Installation"](#).

7.CHECK COOLING FAN ROTATIONAL CONDITION

Rotate the cooling fan by hand.

Dose the cooling fan rotates smoothly?

YES >> GO TO 8.

NO >> Check that the cooling fan is not interfered with other parts.

8.CHECK ELECTRIC CONTROL COOLING FAN COUPLING SYSTEM

Refer to [EC-1517, "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Speed Sensor)

INFOID:000000006466574

1.CHECK COOLING FAN SPEED SENSOR

1. Turn ignition switch OFF.

2. Disconnect electric control cooling fan coupling harness connector.

3. Rotate the electrically-controlled cooling fan coupling slowly with hand and check the voltage between electrically-controlled cooling fan coupling connector terminals under the following conditions.

+	-	Condition	Voltage (V) (Approx.)
Electrically-controlled cooling fan coupling	Terminal		
5	4	5V direct current supply to terminal 2 - Terminal 4 connect to ground	0 ⇔ 5 NOTE: The voltage is in waveform

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Electrically-controlled cooling fan coupling. Refer to [CO-73, "Removal and Installation"](#).

P0530 REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0530 REFRIGERANT PRESSURE SENSOR

DTC Logic

INFOID:000000006466575

DTC DETECTION LOGIC

NOTE:

If DTC P0530 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0530	REFRGRT PRESS SEN (Refrigerant pressure sensor circuit)	- ECM detects open circuit of refrigerant pressure sensor circuit for 2 seconds or more. - ECM detects short circuit to power supply of refrigerant pressure sensor circuit for 2 seconds or more. - ECM detects short circuit to ground of refrigerant pressure sensor circuit for 2 seconds or more.	- Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) - Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1421, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466576

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect refrigerant pressure sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between refrigerant pressure sensor connector terminals.

Refrigerant pressure sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E43	3	1	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-II

Check the voltage between refrigerant pressure sensor connector and ground.

P0530 REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
E43	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK REFRIGERANT PRESSURE SENSOR POWER CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E43	3	F62	123	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E43	1	F62	107	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

P0530 REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

6. CHECK REFRIGERANT PRESSURE SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		-		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E43	2	F62	108	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Replace refrigerant pressure sensor. Refer to [ATC-5. "Precaution for Refrigerant Connection"](#) (with navigation system) or [ATC-130. "Precaution for Refrigerant Connection"](#) (without navigation system).
- NO >> Repair or replace error-detected parts.

P0544 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0544 EGT SENSOR 1

DTC Logic

INFOID:000000006466577

NOTE:

If DTC P0544 is displayed with DTC P0115, first perform the trouble diagnosis for DTC P0115.
Refer to [EC-1352, "DTC Logic"](#).

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0544	EGT SENSOR 1 (Exhaust gas temperature sensor 1 circuit)	- ECM detects open circuit of exhaust gas temperature sensor 1 circuit for 5 seconds or more when accelerated vehicle speed. - ECM detects short circuit to power supply of exhaust gas temperature sensor 1 circuit for 5 seconds or more when accelerated vehicle speed. - ECM detects short circuit to ground of exhaust gas temperature sensor 1 circuit for 5 seconds or more.	- Harness or connectors (Exhaust gas temperature sensor 1 circuit is open or shorted.) - Exhaust gas temperature sensor 1

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1424, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start the engine and warm it up to normal operating temperature.
- Drive vehicle as per the following conditions at least 10 seconds.

CAUTION:

Always drive vehicle at a safe speed.

Gear position	3rd position
Vehicle speed	Accelerates from 55km/h (34 MPH) to 70 km/h (43 MPH)

- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1424, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466578

1. CHECK EXHAUST GAS TEMPERATURE SENSOR 1 POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect exhaust gas temperature sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between exhaust gas temperature sensor 1 harness connector terminals.

P0544 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Exhaust gas temperature sensor 1			Voltage (Approx.)
Connector	+	−	
	Terminal		
F68	2	1	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 POWER SUPPLY-II

Check the voltage between exhaust gas temperature sensor 1 harness connector and ground.

+		–	Voltage (Approx.)
Exhaust gas temperature sensor 1			
Connector	Terminal		
F68	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F68	2	F62	146	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST GAS TEMPERATURE SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor 1 harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F68	1	F62	147	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0544 EGT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK EXHAUST GAS TEMPERATURE SENSOR 1

Check exhaust gas temperature sensor 1. Refer to [EC-1426, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace exhaust gas temperature sensor 1. Refer to [EM-348, "Exploded View"](#).

Component Inspection

INFOID:000000006466579

1.CHECK EXHAUST GAS TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor 1 harness connector.
3. Check the resistance between exhaust gas temperature sensor 1 terminals.

+	—	Condition	Resistance
Exhaust gas temperature sensor 1			
Terminal			
1	2	20°C (68°F)	6.4 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas temperature sensor 1. Refer to [EM-348, "Exploded View"](#).

P0560 BATTERY VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:000000006466580

DTC DETECTION LOGIC

NOTE:

If DTC P0560 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0560	BATTERY VOLTAGE (Battery voltage)	- ECM detects battery voltage 16.6 V or more for 30 seconds or more. - ECM detects battery voltage 6.0 V or less for 0.2 second or more. - Battery current became 0 A state during initialization.	- Harness or connectors (ECM power supply circuit is open or shorted.) - Battery - Battery terminal - Alternator - IPDM E/R

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1427, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466581

1. CHECK BATTERY AND BATTERY TERMINALS

- Turn ignition switch OFF and wait at least 4 minutes.
- Check battery and battery terminals. Refer to [SC-4, "How to Handle Battery"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace battery or repair battery terminals. Refer to [SC-11, "Removal and Installation"](#).

2. CHECK BATTERY VOLTAGE

Check the voltage of battery.

Battery voltage : 11 - 14 V (Approx.)

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Replace battery. Refer to [SC-11, "Removal and Installation"](#).

3. CHECK CHARGING SYSTEM

Check charging system. Refer to [SC-18, "Trouble Diagnosis"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning parts.

4. CHECK ECM POWER SUPPLY (BATTERY)

P0560 BATTERY VOLTAGE

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Disconnect ECM harness connector.
3. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E207	3	Ground	Battery voltage
	5		
	6		

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK ECM POWER SUPPLY CIRCUIT (BATTERY) FOR OPEN AND SHORT

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between ECM harness connector and ECM relay harness connector.

+		—		Continuity
ECM		ECM relay		
Connector	Terminal	Connector	Terminal	
E207	3	E214	5	Existed
	5			
	6			

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0564 ASCD STEERING SWITCH

DTC Logic

INFOID:000000006466582

DTC DETECTION LOGIC

NOTE:

If DTC P0564 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.
Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0564	ASCD SW (ASCD steering switch circuit)	- An excessively high voltage signal from the ASCD steering switch is sent to ECM. - ECM detects that input signal from the ASCD steering switch is out of the specified range. - ECM detects that the ASCD steering switch is stuck ON.	- Harness or connectors (ASCD steering switch circuit is open or shorted.) - ASCD steering switch

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Press ASCD MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RES / + switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET / - switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1429, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466583

1. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

- Turn ignition switch ON.
- Select "DATA MONITOR" mode of "ENGINE" with CONSULT-III.
- Select, "CC/SL STR SW" data monitor item.
- Check each item indication as per the following conditions.

Monitor item	Condition	Indication
CC/SL STR SW	CANCEL switch: Pressed	CANCEL
	SET / - switch: Pressed	SET/-
	RES / + switch: Pressed	RES/+

Without CONSULT-III

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following conditions.

P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

ECM				Condition	Voltage (Approx.)
+		−			
Connector	Terminal	Connector	Terminal		
E207	87 (ASCD steering switch signal)	E207	64 (ASCD steering switch ground)	CANCEL switch: Pressed	0.6 - 1.4 V
				SET / − switch: Pressed	1.6 - 2.3 V
				RES / + switch: Pressed	2.6 - 3.2 V
				All ASCD steering switches: Released	3.6 - 4.4 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch (spiral cable) harness connector terminals.

Combination switch (spiral cable)			Voltage (Approx.)
Connector	+	−	
	Terminal		
M302	16	17	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M302	16	E207	87	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M302	17	E207	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK ASCD STEERING SWITCH

Check ASCD steering switch. Refer to [EC-1431, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

Component Inspection

INFOID:0000000006466584

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)				Condition		Continuity
+		-				
Connector	Terminal	Connector	Terminal			
M302	21	M303	8	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed
			7	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

2.CHECK ASCD STEERING SWITCH-II

P0564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Check the resistance between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)			Condition	Resistance (Approx.)
Connector	+	-		
	Terminal			
M302	16	17	CANCEL switch: Pressed	244 - 254 Ω
			SET / - switch: Pressed	648 - 674 Ω
			RES / + switch: Pressed	1,456 - 1,516 Ω
			All ASCD steering switches: Released	3,896 - 4,056 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

P0571 BPP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0571 BPP SWITCH

DTC Logic

INFOID:000000006466585

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0571	BPP SW (Brake switch/stop lamp switch inconsistency)	Correlation between ASCD brake switch signal and CAN communication signal of stop lamp switch from BCM is inconsistency for 0.4 second while running the engine.	• Harness or connectors (ASCD brake switch circuit is open or shorted) • ASCD brake switch

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1433, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466586

1.CHECK ASCD BRAKE SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

+		−	Condition		Voltage (Approx.)
ECM					
Connector	Terminal				
E207	86	Ground	Brake pedal	Fully released	Battery voltage
				Slightly depressed	0 V

Is the inspection result normal?

YES >> GO TO 5.
Fixed at 0 V>>GO TO 2.
Fixed at battery voltage>>GO TO 4.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connectors.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch and ground.

+		-	Voltage
ASCD brake switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

P0571 BPP SWITCH

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ASCD BRAKE SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

+		-		Continuity
ASCD brake switch		ECM		
Connector	Terminal	Connector	Terminal	
E110	2	E207	86	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH

Check ASCD brake switch. Refer to [EC-1434, "Component Inspection \(ASCD Brake Switch\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace ASCD brake switch. Refer to [BR-6, "Removal and Installation"](#).

5.CHECK DTC WITH "BCM"

Check the self-diagnosis result of BCM with CONSULT-III.

Refer to [BCS-10, "CONSULT-III Function \(BCM\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Perform trouble diagnosis of detected DTC.

Component Inspection (ASCD Brake Switch)

INFOID:000000006466587

1.CHECK ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch			Condition		Continuity
Connector	+	–			
	Terminal				
E110	1	2	Brake pedal	Depressed	Not existed
				Released	Existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace ASCD brake switch. Refer to [BR-6, "Removal and Installation"](#).

P0574 VSS

DTC Logic

INFOID:000000006466588

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0574	VEHICLE SPEED (Vehicle speed signal)	Inconsistency of vehicle speed between display vehicle speed and real vehicle speed.	- Unified meter and A/C amp. - ABS actuator and electric unit (control unit) - Wheel sensor

Diagnosis Procedure

INFOID:000000006466589

1.CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for CAN communication system. Refer to [LAN-14, "Trouble Diagnosis Flow Chart"](#).

2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Check the self-diagnosis result of ABS actuator and electric unit (control unit) with CONSULT-III. Refer to [BRC-19, "CONSULT Functions"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis of detected DTC.

3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check the self-diagnosis result of unified meter and A/C amp. with CONSULT-III. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble diagnosis of detected DTC.

4.CHECK WHEEL SENSOR

Refer to [EC-1359, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or Replace error-detected parts.

P0575 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0575 ASCD STEERING SWITCH

DTC Logic

INFOID:000000006466590

DTC DETECTION LOGIC

NOTE:

If DTC P0575 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0575	ASCD SW (ASCD steering switch circuit)	ECM detects that input signal from the ASCD steering switch is out of the specified range.	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1436, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466591

1. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" with CONSULT-III.
3. Select, "CC/SL STR SW" data monitor item.
4. Check each item indication as per the following conditions.

Monitor item	Condition	Indication
CC/SL STR SW	CANCEL switch: Pressed	CANCEL
	SET / - switch: Pressed	SET/-
	RES / + switch: Pressed	RES/+

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition	Voltage (Approx.)
+		−			
Connector	Terminal	Connector	Terminal		
E207	87 (ASCD steering switch signal)	E207	64 (ASCD steering switch ground)	CANCEL switch: Pressed	0.6 - 1.4 V
				SET / − switch: Pressed	1.6 - 2.3 V
				RES / + switch: Pressed	2.6 - 3.2 V
				All ASCD steering switches: Released	3.6 - 4.4 V

P0575 ASCD STEERING SWITCH

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between combination switch (spiral cable) harness connector terminals.

Combination switch (spiral cable)			Voltage (Approx.)
Connector	+	−	
	Terminal		
M302	16	17	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M302	16	E207	87	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M302	17	E207	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0575 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK ASCD STEERING SWITCH

Check ASCD steering switch. Refer to [EC-1431, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

Component Inspection

INFOID:000000006466592

1.CHECK ASCD STEERING SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)				Condition		Continuity
+		−				
Connector	Terminal	Connector	Terminal			
M302	21	M303	8	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed
			7	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

2.CHECK ASCD STEERING SWITCH-II

Check the resistance between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)			Condition	Resistance (Approx.)
Connector	+	-		
M302	16	17	CANCEL switch: Pressed	244 - 254 Ω
			SET / - switch: Pressed	648 - 674 Ω
			RES / + switch: Pressed	1,456 - 1,516 Ω
			All ASCD steering switches: Released	3,896 - 4,056 Ω

Is the inspection result normal?

YES >> INSPECTION END

P0575 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

- A
- EC
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

P0606 ECM

DTC Logic

INFOID:000000006466593

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	ECM (Engine control module)	ECM calculation function is malfunctioning.	• Harness or connectors (ECM) • Battery • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1440, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466594

1. CHECK BATTERY

Check battery. Refer to [SC-4, "How to Handle Battery"](#).

Is the inspection result normal?

YES >> GO TO 2.
 NO >> Repair or replace error-detected parts.

2. CHECK ECM HARNESS CONNECTOR

Check ECM harness connector for cracks and improper connection or disconnection.

Is the inspection result normal?

YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1440, "DTC Logic"](#).

Is the DTC P0606 displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
 NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P060B ECM

DTC Logic

INFOID:000000006466595

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	ECM (Engine control module)	ECM calculation function is malfunctioning.	• Harness or connectors (ECM) • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1441, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466596

1. CHECK ECM HARNESS CONNECTOR

Check ECM harness connector for cracks and improper connection or disconnection.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace error-detected parts.

2. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1441, "DTC Logic"](#).

Is the DTC P060B displayed again?

- YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
 NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P060C ECM

DTC Logic

INFOID:000000006466597

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060C	MAIN PROCESSOR (Engine control module)	ECM calculation function is malfunctioning.	• Harness or connectors (ECM) • Battery • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1442, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466598

1. CHECK BATTERY

Check battery. Refer to [EC-1223, "Precaution for Battery Service \(for V9X Models\)"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace error-detected parts.

2. CHECK ECM HARNESS CONNECTOR

Check ECM harness connector for cracks and improper connection or disconnection.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1442, "DTC Logic"](#).

Is the DTC P060C displayed again?

- YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
 NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0611 INJECTOR ADJUSTMENT VALUE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0611 INJECTOR ADJUSTMENT VALUE

DTC Logic

INFOID:000000006466599

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0611	INJ ADJ VAL (Injector adjustment value)	- ECM detects at least one abnormal value of injector adjustment value. - At least one injector adjustment value is not stored in ECM.	- Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.) - ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1443, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466600

1.PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform "Injector Adjustment Value Registration". Refer to [EC-1316, "Work Procedure"](#).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1443, "DTC Logic"](#).

Is the DTC P0611 displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P062B ECM

DTC Logic

INFOID:000000006466601

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062B	ECM (Engine control module)	ECM calculation function is malfunctioning.	• Harness or connectors (ECM) • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1444, "Diagnosis Procedure"](#).
 NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start the engine and let it idle.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1444, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466602

1. CHECK ECM HARNESS CONNECTOR

Check ECM harness connector for cracks and improper connection or disconnection.

Is the inspection result normal?

YES >> GO TO 2.
 NO >> Repair or replace error-detected parts.

2. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1444, "DTC Logic"](#).

Is the DTC P062B displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
 NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P062F ECM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P062F ECM

DTC Logic

INFOID:000000006466603

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062F	ECM (Engine control module)	ECM EEPROM system is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1445, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 4 minutes.
2. Turn ignition switch ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1445, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466604

1. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1445, "DTC Logic"](#).

Is the DTC P062F displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006466605

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0641	SENSOR PWR/CIRC1 (Sensor power supply circuit)	- Power source for sensor circuit voltage is abnormally high for 0.1 second or more. - Power source for sensor circuit voltage is abnormally low for 0.1 second or more.	- Harness or connectors (APP sensor 1 power supply circuit is shorted.) (Exhaust gas pressure sensor 1 circuit is shorted.) (Intake air temperature sensor circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) - APP sensor - Exhaust gas pressure sensor 1 - Mass air flow sensor (with intake air temperature sensor) - Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1446, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466606

1. CHECK SENSOR POWER SUPPLY-I

- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

+		–	Voltage (Approx.)
ECM			
Connectors	Terminal	Ground	5 V
E207	44		
	81		
F62	120		
	151		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

- Turn ignition switch OFF.
- Check harness for short to power and to ground, between the following terminals.

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

ECM		Sensor		
Connectors	Terminal	Name	Connectors	Terminal
E207	44	Mass air flow sensor	F23	1
	81	Accelerator pedal position sensor	E108	2
F62	120	Exhaust gas pressure sensor 1	F69	3
	151	Turbocharger boost sensor	E206	1

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor 1. Proceed to [EC-1387, "Diagnosis Procedure"](#).
- Exhaust gas pressure sensor 1. Proceed to [EC-1406, "Diagnosis Procedure"](#).
- Intake air temperature sensor. Proceed to [EC-1349, "Diagnosis Procedure"](#).
- Turbocharger boost sensor. Proceed to [EC-1390, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace malfunctioning component.

P0651 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006466607

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0651	SENSOR PWR/CIRC2 (Sensor power supply circuit)	- Power source for sensor circuit voltage is abnormally high for 0.1 second or more. - Power source for sensor circuit voltage is abnormally low for 0.1 second or more.	- Harness or connectors (APP sensor 2 power supply circuit is shorted.) (EGR volume control valve position sensor circuit is shorted.) (Throttle position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (ASCD steering switch circuit is shorted.) - Accelerator pedal position sensor 2 - EGR volume control valve position sensor - Throttle position sensor - Refrigerant pressure sensor - ASCD steering switch

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1448, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466608

1. CHECK SENSOR POWER SUPPLY

- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

+		-	Voltage (Approx.)
ECM			
Connector	Terminal		
E207	38	Ground	5 V
	40		
	59		
	87		
F62	123		
	148		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 2.

P0651 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

2.CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

1. Turn ignition switch OFF.
2. Check harness for short to power and to ground, between the following terminals.

ECM		Sensor		
Connectors	Terminal	Name	Connectors	Terminal
E207	40	EGR volume control valve	F9	1
	59	Accelerator pedal position sensor	E108	1
	87	Combination switch (spiral cable)	M32	32
F62	123	Refrigerant pressure sensor	E43	3
	148	Electric throttle control actuator	F87	5

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3.CHECK COMPONENTS

Check the following.

- Accelerator pedal position sensor 2. Proceed to [EC-1473, "Diagnosis Procedure"](#).
- Throttle position sensor. Proceed to [EC-1355, "Diagnosis Procedure"](#).
- EGR volume control valve position sensor. Proceed to [EC-1403, "Diagnosis Procedure"](#).
- Refrigerant pressure sensor. Proceed to [EC-1421, "Diagnosis Procedure"](#).
- ASCD steering switch. Proceed to [EC-1436, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace malfunctioning component.

P0670 GLOW CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0670 GLOW CONTROL SYSTEM

DTC Logic

INFOID:000000006466609

DTC DETECTION LOGIC

NOTE:

If DTC P0670 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0670	GLOW CONT SYSTEM (Glow control unit circuit)	- ECM detects open circuit of glow control unit circuit for 0.1 second or more when glow control system is functioning. - ECM detects short circuit to power supply of glow control unit circuit for 0.1 second or more when glow control system is functioning. - ECM detects short circuit of glow control unit circuit for 0.1 second or more when glow control system is functioning.	- Harness or connectors (Glow control unit circuit is open or shorted.) - Glow control unit

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Check that the engine coolant temperature is 20°C (68°F) or less.

NOTE:

If engine coolant temperature is above 20°C (68°F), cool down the engine and then go to the next step.

2. Start the engine and let it idle at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1450, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466610

1. CHECK GLOW CONTROL UNIT POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect glow control unit harness connector.
3. Check the voltage between glow control unit harness connector and ground.

+		-	Voltage
Glow control unit			
Connector	Terminal		
F61	10	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2. CHECK GLOW CONTROL UNIT POWER SUPPLY-II

1. Turn ignition switch ON.

P0670 GLOW CONTROL SYSTEM

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

2. Check the voltage between glow control unit harness connector and ground.

+		-	Voltage
Glow control unit			
Connector	Terminal		
F61	11	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK GLOW CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between glow control unit harness connector and ECM relay harness connector.

+		-		Continuity
Glow control unit		ECM relay		
Connector	Terminal	Connector	Terminal	
F61	11	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK GLOW CONTROL UNIT GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
Glow control unit		ECM		
Connector	Terminal	Connector	Terminal	
F61	9	E207	14	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.GLOW CONTROL UNIT SIGNAL CIRCUIT

P0670 GLOW CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

1. Check the continuity between glow control unit harness connector and ECM harness connector.

+		-		Continuity
Glow control unit		ECM		
Connector	Terminal	Connector	Terminal	
F61	7	E207	50	Existed
	8		74	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.REPLACE GLOW CONTROL UNIT

1. Replace glow control unit. Refer to [EC-1228, "Component Parts Location"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1450, "DTC Logic"](#).

Is the DTC P0670 displayed again?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> INSPECTION END

P0671, P0672, P0673, P0674, P0675, P0676 GLOW PLUG

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0671, P0672, P0673, P0674, P0675, P0676 GLOW PLUG

DTC Logic

INFOID:000000006466611

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0671	CYLINDER 1 GLOW PLUG (Glow plug No.1 circuit)	Each glow plug circuit voltage is abnormal for 2 seconds or more when glow control system functioning.	• Harness or connectors (Glow plug circuit is open or shorted.) • Glow plug
P0672	CYLINDER 2 GLOW PLUG (Glow plug No.2 circuit)		
P0673	CYLINDER 3 GLOW PLUG (Glow plug No.3 circuit)		
P0674	CYLINDER 4 GLOW PLUG (Glow plug No.4 circuit)		
P0675	CYLINDER 5 GLOW PLUG (Glow plug No.5 circuit)		
P0676	CYLINDER 6 GLOW PLUG (Glow plug No.6 circuit)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Check that the engine coolant temperature is 20°C (68°F) or less.

NOTE:

If engine coolant temperature is above 20°C (68°F), cool down the engine and then go to the next step.

2. Start the engine and let it idle at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1453, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466612

1.CHECK GLOW PLUG POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow control unit harness connector.
3. Disconnect glow plug harness connector.
4. Check the continuity between glow plug harness connector and glow control unit harness connector.

P0671, P0672, P0673, P0674, P0675, P0676 GLOW PLUG

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+			-		Continuity
Glow plug			Glow control unit		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F251	1	F61	1	Existed
2	F252	1		2	
3	F253	1		3	
4	F254	1		4	
5	F255	1		5	
6	F256	1		6	

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK GLOW PLUG

Check glow plug. Refer to [EC-1454, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning glow plug. Refer to [EM-313, "Removal and Installation"](#).

3.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> Replace glow control unit. Refer to [EC-1228, "Component Parts Location"](#).

NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:000000006466613

NOTE:

- Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.
- If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.
- Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plug harness connector.
3. Check the resistance between glow plug terminal and engine ground.

+	−	Condition	Resistance
Glow plug			
Terminal			
1	Engine ground	20°C (68°F)	0.1 - 1.0 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning glow plug. Refer to [EM-313, "Removal and Installation"](#).

P0685 ECM RELAY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0685 ECM RELAY

DTC Logic

INFOID:000000006466614

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0685	ECM RELAY (ECM relay circuit)	- ECM detects open circuit of ECM relay circuit. - ECM detects short circuit to power supply of ECM relay circuit. - ECM detects short circuit to ground of ECM relay circuit for 2 seconds or more after stopped the engine.	- Harness or connectors (ECM relay circuit is open or shorted.) - IPDM E/R (ECM relay)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip TC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1455, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466615

1. CHECK ECM POWER SUPPLY-I

- Turn ignition switch OFF and wait at least 4 minutes.
- Disconnect ECM harness connector.
- Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E207	49	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

- Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
- Check the continuity between ECM harness connector and ECM relay harness connector.

+		-		Continuity
ECM		ECM relay		
Connector	Terminal	Connector	Terminal	
E207	49	E214	2	Existed

- Also check harness for short to ground.

Is the inspection result normal?

P0685 ECM RELAY

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ECM POWER SUPPLY-II

1. Install ECM relay.
2. Turn ignition switch ON.
3. Check the voltage between ECM relay harness connector and ground.

+		-	Voltage
ECM relay			
Connector	Terminal		
E214	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK ECM RELAY

Check ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

5.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM relay harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E214	1	E13	30	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK FUSE

Check that the following fuse is fusing.

Location	Fuse No.	Capacity
IPDM E/R	64	10 A

Is the fuse fusing?

- YES >> Replace fuse.
NO >> Perform the trouble diagnosis for power supply circuit.

7.CHECK ECM POWER SUPPLY-II

1. Turn ignition switch ON.
2. Check the voltage between ECM relay harness connector and ground.

P0685 ECM RELAY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage
ECM			
Connector	Terminal		
E207	3	Ground	Battery voltage
	5		
	6		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 8.

8.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between ECM harness connector and ECM relay harness connector.

+		-		Continuity
ECM		ECM relay		
Connector	Terminal	Connector	Terminal	
E207	3	E214	5	Existed
	5			
	6			

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

Component Inspection (ECM Relay)

INFOID:000000006466616

1.CHECK ECM RELAY

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

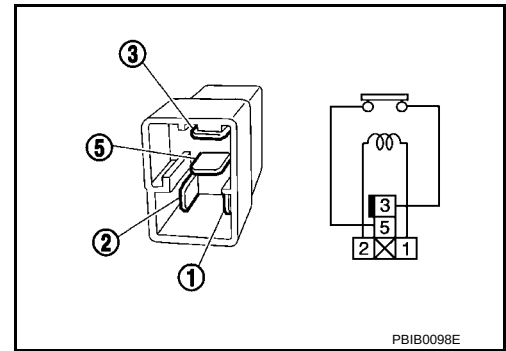
P0685 ECM RELAY

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between ECM relay terminals as per the following conditions.

+	—	Conditions	Continuity
ECM relay			
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ECM relay. Refer to [EC-1228, "Component Parts Location"](#).

P0697 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P0697 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000006466617

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0697	SENSOR PWR/CIRC3 (Sensor power supply circuit)	- Power source for sensor circuit voltage is abnormally high for 0.1 second or more. - Power source for sensor circuit voltage is abnormally low for 0.1 second or more.	- Harness or connectors (Fuel rail pressure sensor circuit is shorted.) - Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1459, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466618

1. CHECK SENSOR POWER SUPPLY

- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

+		-	Voltage (Approx.)
ECM			
Connector	Terminal		
F62	133	Ground	5 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> GO TO 2.

2. CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

- Turn ignition switch OFF.
- Check harness for short to power and to ground, between the following terminals.

ECM		Fuel rail pressure sensor	
Connectors	Terminal	Connectors	Terminal
F62	133	F260	3

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair short to ground or short to power in harness or connectors.

3. CHECK COMPONENTS

P0697 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Check the fuel rail pressure sensor. Proceed to [EC-1378, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
- NO >> Replace malfunctioning component.

P1001 MONITOOL ACTIVATION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1001 MONITOOL ACTIVATION

Description

INFOID:000000006466619

This DTC is a status flag indicating the activation of the Active Test in CONSULT-III.
This DTC indicated only after the Active Test and erased after the ignition switch is turned OFF.

DTC Logic

INFOID:000000006466620

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1001	MNTRTOOL FNCTN (Monitor tool activation)	Active Test is activated.	None

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

this DTC is displayed as Active Test activation history. If this DTC is not detected after diagnosis procedure, the system has not malfunction.

>> [EC-1461, "Diagnosis Procedure"](#)

Diagnosis Procedure

INFOID:000000006466621

1.ERASE THE DTC

1. Turn the ignition switch OFF at least 5 seconds.
2. Turn the ignition switch ON.
3. Check self-diagnostic results.
4. Check that DTC P1001 is not detected.

>> INSPECTION END

P1201, P1202, P1203, P1204, P1205, P1206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1201, P1202, P1203, P1204, P1205, P1206 FUEL INJECTOR

DTC Logic

INFOID:000000006466622

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1201	CYL 1 INJECTOR (Fuel injector No. 1 performance)	Fuel injector No. 1 does not operate properly.	• Harness or connectors (Fuel injector circuit is open or shorted) • Fuel injector
P1202	CYL 2 INJECTOR (Fuel injector No. 2 performance)	Fuel injector No. 2 does not operate properly.	
P1203	CYL 3 INJECTOR (Fuel injector No. 3 performance)	Fuel injector No. 3 does not operate properly.	
P1204	CYL 4 INJECTOR (Fuel injector No. 4 performance)	Fuel injector No. 4 does not operate properly.	
P1205	CYLINDER 5 INJECTOR (Fuel injector No. 5 performance)	Fuel injector No. 5 does not operate properly.	
P1206	CYLINDER 6 INJECTOR (Fuel injector No. 6 performance)	Fuel injector No. 6 does not operate properly.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1462, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466623

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel injector harness connector.
3. Check the continuity between ECM harness connector and fuel injector harness connector.

DTC	+			-		Continuity
	Fuel injector			ECM		
	Cylinder	Connector	Terminal	Connector	Terminal	
P1201	1	F64	1	F62	110	Existed
P1202	2	F70	1		126	
P1203	3	F65	1		111	
P1204	4	F71	1		127	
P1205	5	F66	1		112	
P1206	6	F72	1		125	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

P1201, P1202, P1203, P1204, P1205, P1206 FUEL INJECTOR

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK FUEL INJECTOR GROUND CIRCUIT

1. Check the continuity between ECM harness connector and fuel injector harness connector.

DTC	+			-		Continuity
	Fuel injector			ECM		
	Cylinder	Connector	Terminal	Connector	Terminal	
P1201	1	F64	2	F62	95	Existed
P1202	2	F70	2		141	
P1203	3	F65	2		96	
P1204	4	F71	2		142	
P1205	5	F66	2		97	
P1206	6	F72	2		140	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1463, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace malfunctioning fuel injector. Refer to [EM-316, "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:000000006466624

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

+	−	Resistance
Fuel injector		
Terminal		
1	2	150 - 210 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel injector. Refer to [EM-316, "Removal and Installation"](#).

P1525 ASCD SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1525 ASCD SYSTEM

DTC Logic

INFOID:000000006466625

DTC DETECTION LOGIC

NOTE:

DTC P1525 is displayed with another DTC.

Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1525	ASCD FUNCTION (ASCD system)	Other DTC that illuminates MI is detected while ASCD is operating.	• Harness or connectors • Others systems • ECM

Diagnosis Procedure

INFOID:000000006466626

DTC P1525 is displayed with another DTC.

Perform the trouble diagnosis for the corresponding DTC. Refer to [EC-1288, "DTC Index"](#).

P1607 ECM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1607 ECM

DTC Logic

INFOID:000000006466627

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1607	ECM (Engine control module)	ECM function is malfunctioning.	ECM

Diagnosis Procedure

INFOID:000000006466628

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
3. Perform DTC confirmation procedure again. Refer to [EC-1465, "DTC Logic"](#).

Is the DTC P1607 displayed again?

- YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
NO >> INSPECTION END

P1609 ECM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1609 ECM

DTC Logic

INFOID:000000006466629

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1609	ECM (Engine control module)	ECM calculation function is malfunctioning.	• Harness or connectors (ECM) • ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1466, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466630

1. CHECK ECM HARNESS CONNECTOR

Check ECM harness connector and fuel injector harness connector for cracks and improper connection or disconnection.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2. DTC CONFIRMATION PROCEDURE

1. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
2. Perform DTC confirmation procedure again. Refer to [EC-1466, "DTC Logic"](#).

Is the DTC P1609 displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P1616 ECM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P1616 ECM

DTC Logic

INFOID:000000006466631

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1616	ECM C/U [Engine control module (ROM)]	ECM ROM is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1467, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466632

1. DTC CONFIRMATION

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC-1467, "DTC Logic"](#).
4. Check the DTC.

Is the DTC displayed again?

YES >> Replace ECM. Refer to [EC-1541, "Removal and Installation"](#).
NO >> INSPECTION END

P2100 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2100 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:000000006466633

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	ETC FUNCTION (Throttle control motor circuit)	- Throttle control motor circuit current is higher than specification value for 0.5 second or more when throttle control motor is actuated. - ECM detects open circuit of throttle control motor circuit for 0.3 second or more after ignition switch OFF. - ECM detects short circuit to power supply of throttle control motor circuit for 0.5 second or more when throttle control motor is actuated. - ECM detects short circuit to ground of throttle control motor circuit for 0.5 second or more when throttle control motor is actuated. - ECM detects short circuit to between each throttle control motor circuits for 0.5 second or more when throttle control motor is actuated. - ECM detects throttle control motor is not actuated for 0.5 second or more.	- Harness or connectors (Throttle control motor circuit is open or shorted) - Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1468, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Turn ignition switch OFF and wait at least 4 minutes.
- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1468, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466634

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

P2100 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F87	1	F62	129	Existed
			128	Not existed
	2		128	Existed
			129	Not existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to [EC-1469, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

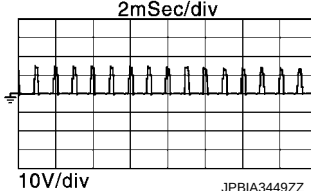
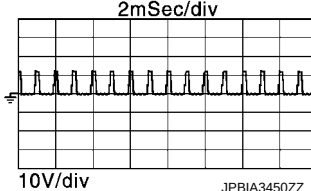
NO >> Replace electric throttle control actuator. Refer to [EM-309, "Removal and Installation"](#).

Component Inspection

INFOID:000000006466635

1.CHECK ELECTRIC THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check the voltage between ECM harness connectors terminals as per the following conditions.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F62	128 (Throttle control motor)	E207	1	[Engine is running] • Warm-up condition • Idle speed	
				[Ignition switch: OFF] • For 20 seconds after turning ignition switch OFF	
				[Ignition switch: OFF] • More than 20 seconds after turning ignition switch OFF	0.1 V
	129 (Throttle control motor)			[Engine is running] • Warm-up condition • Idle speed	0 V

Is the inspection result normal?

YES >> INSPECTION END

P2100 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace electric throttle control actuator. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:000000006466636

DTC DETECTION LOGIC

NOTE:

If DTC P2101 is displayed with DTC P0606 or DTC P060C, perform the trouble diagnosis for P0606 or DTC P060C.

Refer to [EC-1440, "DTC Logic"](#) or [EC-1442, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2101	ETC FUNCTION (Electric throttle control actuator performance)	- ECM detects throttle valve is stuck open or stuck closed for 0.5 second when control throttle valve first. - ECM detects throttle valve is stuck closed for 4.0 seconds. - ECM detects throttle valve fully open position and fully closed position is less than specification position for 0.5 second.	- Harness or connectors (Electric throttle control actuator circuit is open or shorted.) - Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 4 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1471, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466637

1. CHECK THROTTLE CONTROL MOTOR

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		-		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F87	1	F62	129	Existed
			128	Not existed
	2		128	Existed
			129	Not existed

- Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-300, "Removal and Installation"](#).
2. Check if foreign matter is caught between the electric throttle control actuator and the housing.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Remove the foreign matter and clean the electric throttle control actuator. Refer to [EM-309, "Removal and Installation"](#).

3.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to [EC-1472, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

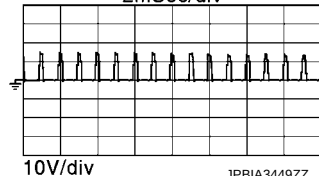
NO >> Replace electric throttle control actuator. Refer to [EM-309, "Removal and Installation"](#).

Component Inspection

INFOID:000000006466638

1.CHECK ELECTRIC THROTTLE CONTROL MOTOR

1. Reconnect all harness connectors disconnected.
2. Check the voltage between ECM harness connectors terminals as per the following conditions.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F62	128 (Throttle control motor)	E207	1	[Engine is running] • Warm-up condition • Idle speed 	
				[Ignition switch: OFF] • For 20 seconds after turning ignition switch OFF 	
				[Ignition switch: OFF] • More than 20 seconds after turning ignition switch OFF 0.1 V	
	129 (Throttle control motor)			[Engine is running] • Warm-up condition • Idle speed 0 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to [EM-309, "Removal and Installation"](#).

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2120 APP SENSOR

DTC Logic

INFOID:000000006466639

DTC DETECTION LOGIC

NOTE:

If DTC P2120 is displayed with DTC P0651, first perform the trouble diagnosis for DTC P0651.

Refer to [EC-1448, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2120	APP SENSOR 2 (Accelerator pedal position sensor 2 circuit)	- ECM detects open circuit of APP sensor 2 circuit for 0.3 second or more when accelerator pedal is depressed. - ECM detects short circuit to power supply of APP sensor 2 circuit for 0.3 second or more when accelerator pedal is depressed. - ECM detects short circuit to ground of APP sensor 2 circuit for 0.3 second or more when accelerator pedal is depressed. - Correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range for 0.5 second or more when accelerator pedal is depressed.	- Harness or connectors (APP sensor 2 circuit is open or shorted) - APP sensor (1 and 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Fully depress the accelerator pedal.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1473, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466640

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY-I

- Turn ignition switch OFF.
- Disconnect accelerator pedal position sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between accelerator pedal position sensor harness connector terminals.

Accelerator pedal position sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
E108	1	5	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

2. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY-II

Check the voltage between accelerator pedal position sensor harness connector and ground.

+		–	Voltage (Approx.)
Accelerator pedal position sensor			
Connector	Terminal		
E108	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	1	E207	59	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	5	E207	80	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

P2120 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR 2 SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+		-		Continuity
Accelerator pedal position sensor		ECM		
Connector	Terminal	Connector	Terminal	
E108	6	E207	58	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check accelerator pedal position sensor. Refer to [EC-1475, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006466641

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	Terminal				
	+	−			
E207	57 (APP sensor 1)	79	Accelerator pedal	Fully released	0.7 V
				Fully depressed	4.5 V
	58 (APP sensor 2)	80		Fully released	0.3 V
				Fully depressed	2.2 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

P2146, P2149 FUEL INJECTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2146, P2149 FUEL INJECTOR POWER SUPPLY

DTC Logic

INFOID:000000006466642

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2146	INJ PWR/CIRC [Group A (cylinder No.2, No.4 and No. 6) fuel injector circuit]	- ECM detects short circuit to ground of fuel injector circuit for 2 seconds or more while running the engine at idle speed. - ECM detects malfunction of fuel injector for 4 seconds or more while running the engine at idle speed.	- Harness or connectors (Fuel injector circuit is shorted.) - Fuel injector
P2149	INJ PWR/CIRC [Group B (cylinder No.1, No.3 and No. 5) fuel injector circuit]		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1476, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466643

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect fuel injector connector.
- Check the continuity between fuel injector harness connector and ECM harness connector.

DTC	Fuel injector			ECM	
	Cylinder	Connector	Terminal	Connector	Terminal
P2146	2	F70	1	F62	126
	4	F71	1		127
	6	F72	1		125
P2149	1	F64	1		110
	3	F65	1		111
	5	F66	1		112

- Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1477, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

P2146, P2149 FUEL INJECTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

- YES >> Check intermittent incident. Refer to [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
- NO >> Replace fuel injector of malfunctioning cylinder. Refer to [EM-316. "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:000000006466644

EC

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

+	−	Resistance
Fuel injector		
Terminal		
1	2	150 - 210 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace fuel injector. Refer to [EM-316. "Removal and Installation"](#).

P2226 BARO SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2226 BARO SENSOR

DTC Logic

INFOID:000000006466645

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2226	(Barometric pressure sensor circuit)	- Barometric pressure sensor voltage sent to ECM is 4.8 V or more for 0.3 second or more. - Barometric pressure sensor voltage sent to ECM is 0.2 V or less for 0.3 second or more.	Barometric pressure sensor (built into the ECM)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1478, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466646

1. DTC CONFIRMATION

- Turn ignition switch ON.
- Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
- Perform DTC confirmation procedure. Refer to [EC-1478, "DTC Logic"](#).
- Check DTC.

Is the DTC P2226 displayed again?

YES >> Replace ECM (Barometric pressure sensor). Refer to [EC-1541, "Removal and Installation"](#).
NO >> INSPECTION END

P2231 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2231 A/F SENSOR 1

DTC Logic

INFOID:000000006466647

DTC DETECTION LOGIC

NOTE:

If DTC P2231 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2231	A/F SENSOR1 (Air fuel ratio sensor circuit)	A/F signal computed by ECM from the air fuel ratio sensor signal is out of the specified range.	• Harness or connectors (Air fuel ratio sensor circuit is shorted.) • Air fuel ratio sensor

Diagnosis Procedure

INFOID:000000006466648

1.CHECK AIR FUEL RATIO (A/F) SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor harness connector and ground.

+		-	Voltage
A/F sensor			
Connector	Terminal		
F67	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor harness connector and ECM harness connector.

+		-		Continuity
A/F sensor		ECM		
Connector	Terminal	Connector	Terminal	
F67	1	E207	32	Existed
	2		10	
	5		33	
	6		11	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-II

1. Check the continuity between A/F sensor harness connector and ground.

P2231 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Continuity
A/F sensor			
Connector	Terminal		
F67	1	Ground	Not existed
	2		
	5		
	6		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK A/F SENSOR INPUT SIGNAL CIRCUIT-III

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	10	Ground	Not existed
	11		
	32		
	33		

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning parts.

6.REPLACE A/F SENSOR

Replace A/F sensor. Refer to [EM-311, "Exploded View"](#).

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P2263 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2263 TC SYSTEM

DTC Logic

INFOID:000000006466649

DTC DETECTION LOGIC

NOTE:

- If DTC P2263 displayed with DTC P0470, first perform the trouble diagnosis for DTC P0470. Refer to [EC-1406, "DTC Logic"](#).
- If DTC P2263 displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685. Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2263	TC SYSTEM (Turbocharger boost control system performance)	• Turbocharger boost pressure is higher 400 hPa or more than a specification value for 10 seconds or more. • Turbocharger boost pressure is lower 200 hPa or more than a specification value for 10 seconds or more.	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve • Turbocharger boost pressure sensor • Vacuum pump • Vacuum hose • Turbocharger system • Intake air system • EGR circuit

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep engine speed more than 3,000 rpm for at least 15 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1481, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466650

1. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

Turbocharger boost sensor			Voltage (Approx.)
Connector	+	−	
	Terminal		
E206	1	3	5 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 2.

2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY-II

Check the voltage between turbocharger boost sensor harness connector and ground.

+		–	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
E206	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	1	F62	151	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	3	E207	17	Existed

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
E206	2	E207	39	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.

P2263 TC SYSTEM

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< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

+		-	Voltage
Turbocharger boost control solenoid valve			
Connector	Terminal		
E220	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM relay harness connector.

+		-		Continuity
Turbocharger boost control solenoid valve		ECM relay		
Connector	Terminal	Connector	Terminal	
E220	2	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

8.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
E220	1	F62	114	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to [EC-1484, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

10.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check turbocharger boost control solenoid valve. Refer to [EC-1484, "Component Inspection \(Turbocharger Boost Control Solenoid Valve\)"](#).

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Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace turbocharger boost control solenoid valve. Refer to [EC-1228, "Component Parts Location"](#).

11.CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 12.

12.CHECK CONNECTION OF EXHAUST GAS PRESSURE SENSOR 1 HARNESS CONNECTOR

Check the connection of exhaust gas pressure sensor 1 harness connector.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Reconnect exhaust gas pressure sensor 1 harness connector definitely.

13.CHECK EGR CIRCUIT

Check EGR circuit for leak.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace error-detected parts.

14.CHECK TURBOCHARGER

Check if foreign matter is caught between the turbocharger. Refer to [EM-348, "Exploded View"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Remove the foreign matter and clean the turbocharger. Refer to [EM-348, "Exploded View"](#).

Component Inspection (Turbocharger Boost Control Solenoid Valve)

INFOID:000000006466651

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Check the resistance between turbocharger boost control solenoid valve terminals.

+	−	Resistance
Turbocharger boost control solenoid valve		
Terminal		
1	2	6 Ω - 1 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost control solenoid valve. Refer to [EC-1543, "Hydraulic Layout"](#).

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000006466652

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Start the engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector terminals as per the following conditions.

P2263 TC SYSTEM

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[V9X]

ECM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
E207	39 (Turbocharg- er boost sen- sor signal)	17 (Sensor ground)	Idle (Engine is warmed-up to normal operating temperature.)	1.3 V
			Idle to about 2,000 rpm	1.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to [EM-307, "Exploded View"](#).

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P2293 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2293 FRP CONTROL SYSTEM

DTC Logic

INFOID:000000006466653

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2293	FRP CONTROL SYSTEM (Fuel rail pressure regulation actuator function)	Fuel rail pressure is out of the target range.	• Harness or connectors - (Fuel rail pressure regulation actuator circuit is open or shorted.) - (Fuel flow actuator circuit is open or shorted.) - (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure regulation actuator • Fuel flow actuator • High pressure fuel pump • Fuel injector • Fuel filter • Air mixed with fuel • Lack of fuel • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1486, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466654

1. PERFORM FUEL FILTER AIR BLEEDING

NOTE:

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

1. Turn ignition switch ON.
2. Perform fuel filter air bleeding. Refer to [FL-31, "Air Bleeding"](#).
3. Erase DTC. Refer to [EC-1262, "Diagnosis Description"](#).
4. Perform DTC confirmation procedure again. Refer to [EC-1486, "DTC Logic"](#).

Is the DTC P2293 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2. CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel filter. Refer to [FL-30, "Removal and Installation"](#).

3. CHECK FOR FUEL LEAK

< DTC/CIRCUIT DIAGNOSIS >

Check for fuel leakage at fuel circuit.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning parts.

4.CHECK FUEL FLOW ACTUATOR CIRCUIT

Check the fuel flow actuator circuit. Perform [EC-1342, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL RAIL REGULATION ACTUATOR CIRCUIT

Check the fuel rail regulation actuator circuit. Perform [EC-1488, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK FUEL RAIL PRESSURE SENSOR CIRCUIT

Check the fuel rail pressure sensor circuit. Refer to [EC-1378, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace fuel rail (bank 1 side) assembly. Refer to [EM-315, "Exploded View"](#).

7.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC-1487, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> Replace high pressure fuel pump. Refer to [EM-304, "Removal and Installation"](#).

NO >> Replace malfunctioning fuel injector. Refer to [EM-316, "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:000000006466655

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check the resistance between fuel injector terminals.

+	−	Resistance
Fuel injector		
Terminal		
1	2	150 - 210 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector. Refer to [EM-315, "Exploded View"](#).

P2294 FRP CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2294 FRP CONTROL VALVE

DTC Logic

INFOID:000000006466656

DTC DETECTION LOGIC

NOTE:

If DTC P2294 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2294	FRP CONTROL VALVE (Fuel rail pressure regulation actuator circuit)	- ECM detects open circuit of fuel rail pressure regulation actuator for 0.3 second or more while running the engine when fuel rail pressure regulation actuator is not actuated. - ECM detects short circuit to power supply of fuel rail pressure regulation actuator for 0.3 second or more when fuel rail pressure regulation actuator is actuated. - ECM detects short circuit to ground of fuel rail pressure regulation actuator for 0.3 second or more when fuel rail pressure regulation actuator is not actuated. - ECM detects fuel rail pressure regulation actuator is not actuated for 0.3 second or more.	- Harness or connectors (Fuel rail pressure regulation actuator circuit is open or shorted.) - Fuel rail pressure regulation actuator

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1488, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466657

1. CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect fuel rail pressure regulation actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel rail pressure regulation actuator harness connector and ground.

+		-	Voltage
Fuel rail pressure regulation actuator			
Connector	Terminal		
F74	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.

P2294 FRP CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between fuel rail pressure regulation actuator harness connector and ECM relay harness connector.

+		-		Continuity
Fuel rail pressure regulation actuator		ECM relay		
Connector	Terminal	Connector	Terminal	
F74	1	E214	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure regulation actuator harness connector and ECM harness connector.

+		-		Continuity
Fuel rail pressure regulation actuator		ECM		
Connector	Terminal	Connector	Terminal	
F74	2	F62	99	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR

Check fuel rail pressure regulation actuator. Refer to [EC-1489, "Component Inspection \(Fuel Rail Pressure Regulation Actuator\)"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace fuel rail (bank 2 side) assembly. Refer to [EM-315, "Exploded View"](#).

Component Inspection (Fuel Rail Pressure Regulation Actuator)

INFOID:000000006466658

1.CHECK FUEL RAIL PRESSURE REGULATION ACTUATOR

1. Turn ignition switch OFF.
2. Disconnect fuel rail pressure regulation actuator harness connector.
3. Check the resistance between fuel rail pressure regulation actuator.

+	—	Resistance
Fuel rail pressure regulation actuator		
Terminal		
1	2	1 - 30 Ω

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace fuel rail (bank 2 side) assembly. Refer to [EM-315, "Exploded View"](#).

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

DTC Logic

INFOID:000000006466659

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2299	APP/BPP INCNSSTNCY (Accelerator pedal/brake pedal position inconsistency)	- Signal from accelerator pedal position sensor and ASCD brake switch becomes ON at the same time. - No signals from accelerator pedal position sensor 1 and 2 are sent to ECM for 0.6 second or more.	- Harness or connectors (Accelerator pedal position sensor circuit is open or shorted.) - Accelerator pedal position sensor - Accelerator pedal

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for at least 30 seconds.
2. Keep the engine speed at 2,000 rpm for at least 30 seconds.
3. Release accelerator pedal and apply service brake for at least 30 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1490, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466660

1.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor harness connector terminals.

Accelerator pedal position sensor				Voltage (Approx.)
Sensor	Connector	+	–	
		Terminal		
1	E108	2	4	5 V
2		1	5	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY-II

Check the voltage between accelerator pedal position sensor harness connector and ground.

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+			-	Voltage (Approx.)
Accelerator pedal position sensor				
Sensor	Connector	Terminal		
1	E108	2	Ground	5 V
2		1		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+			-		Continuity
Accelerator pedal position sensor			ECM		
Sensor	Connector	Terminal	Connector	Terminal	
1	E108	2	E207	81	Existed
2		1		59	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+			-		Continuity
Accelerator pedal position sensor			ECM		
Sensor	Connector	Terminal	Connector	Terminal	
1	E108	4	E207	79	Existed
2		5		80	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

+			-		Continuity
Accelerator pedal position sensor			ECM		
Sensor	Connector	Terminal	Connector	Terminal	
1	E108	3	M111	57	Existed
2		6		58	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check accelerator pedal position sensor. Refer to [EC-1493, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

8.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E207	86	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 9.

9.CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

+		−	Voltage
ASCD brake switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.

NO >> Perform the trouble diagnosis for power supply circuit.

10.CHECK ASCD BRAKE SWITCH GROUND CIRCUIT

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

+		-		Continuity
ASCD brake switch		ECM		
Connector	Terminal	Connector	Terminal	
E110	2	E207	86	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK ASCD BRAKE SWITCH

Check ASCD brake switch. Refer to [EC-1493, "Component Inspection \(ASCD Brake Switch\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD brake switch. Refer to [BR-5, "Inspection and Adjustment"](#).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000006466661

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	Terminal				
	+	−			
E207	57 (APP sensor 1)	79	Accelerator pedal	Fully released	0.7 V
				Fully depressed	4.5 V
	58 (APP sensor 2)	80		Fully released	0.3 V
				Fully depressed	2.2 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal position sensor. Refer to [ACC-3, "Removal and Installation"](#).

Component Inspection (ASCD Brake Switch)

INFOID:000000006466662

1.CHECK ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals as per the following conditions.

ASCD brake switch			Condition		Continuity
Connector	+	−			
	Terminal				
E110	1	2	Brake pedal	Depressed	Not existed
				Released	Existed

Is the inspection result normal?

YES >> INSPECTION END

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace ASCD brake switch. Refer to [BR-5, "Inspection and Adjustment"](#).

P2425 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2425 EGR COOLING PUMP

DTC Logic

INFOID:000000006466663

DTC DETECTION LOGIC

NOTE:

If DTC P2425 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2425	EGR COOLER BYP/V (EGR cooling water pump circuit)	- ECM detects open circuit of EGR cooling water pump circuit for 0.4 second or more when EGR cooling water pump is not actuated in ignition switch ON. - ECM detects short circuit to power supply EGR cooling water pump circuit for 0.4 second or more while running the engine when EGR cooling water pump actuated. - ECM detects short circuit to ground EGR cooling water pump circuit for 0.4 second or more when EGR cooling water pump is not actuated in ignition switch ON. - ECM detects EGR cooling water pump does not actuated for 0.5 second or more while running the engine.	- Harness or connectors (EGR cooling water pump circuit is open or shorted.) - EGR cooling water pump

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1495, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start the engine and let it idle at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1495, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466664

1. CHECK EGR COOLING WATER PUMP POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect EGR cooling water pump harness connector.
- Check the voltage between EGR cooling water pump harness connector and ground.

P2425 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-	Voltage
EGR cooling water pump			
Connector	Terminal		
E203	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK EGR COOLING WATER PUMP POWER SUPPLY CIRCUIT

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between EGR cooling water pump harness connector and ECM relay harness connector.

+		-		Continuity
EGR cooling water pump		ECM relay		
Connector	Terminal	Connector	Terminal	
E203	1	E214	5	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK EGR COOLING WATER PUMP GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between EGR cooling water pump harness connector and ECM harness connector.

+		-		Continuity
EGR cooling water pump		ECM		
Connector	Terminal	Connector	Terminal	
E203	2	E207	29	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK EGR COOLING WATER PUMP

Check EGR cooling water pump. Refer to [EC-1497, "Component Inspection"](#).

P2425 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
- NO >> Replace EGR cooling water pump. Refer to [CO-78, "Removal and Installation"](#).

Component Inspection

INFOID:000000006466665

EC

1. CHECK EGR COOLING WATER PUMP

1. Turn ignition switch OFF.
2. Disconnect EGR cooling water pump harness connector.
3. Check the resistance between EGR cooling water PUMP terminals.

+	−	Resistance
EGR cooling water pump		
Terminal		
1	2	43 - 49 Ω

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EGR cooling water pump. Refer to [CO-78, "Removal and Installation"](#).

P2457 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2457 EGR COOLING PUMP

DTC Logic

INFOID:000000006466666

DTC DETECTION LOGIC

NOTE:

- If DTC P2457 is displayed with DTC P2425, first perform the trouble diagnosis for DTC P2425. Refer to [EC-1495, "DTC Logic"](#).
- If DTC P2457 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685. Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2457	EGR COOLING SYSTEM (EGR cooling water pump circuit)	• Signal from a sensor is sent to ECM at frequency too high for 5 seconds or more. • Signal from a sensor is sent to ECM at frequency too low for 5 seconds or more. • No signal from the sensor is sent to ECM for 5 seconds or more.	• Harness or connectors (EGR cooling water pump circuit is open or shorted.) • EGR cooling water pump • Engine cooling system circuit

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC-1507, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466667

1. CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning parts.

2. CHECK EGR COOLING WATER PUMP POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR cooling water pump harness connector.
3. Check the voltage between EGR cooling water pump harness connector and ground.

+		-	Voltage
EGR cooling water pump			
Connector	Terminal		
E203	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

P2457 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

3.CHECK EGR COOLING WATER PUMP POWER SUPPLY CIRCUIT

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between EGR cooling water pump harness connector and ECM relay harness connector.

+		-		Continuity
EGR cooling water pump		ECM relay		
Connector	Terminal	Connector	Terminal	
E203	1	E214	5	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK EGR COOLING WATER PUMP GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between EGR cooling water pump harness connector and ECM harness connector.

+		-		Continuity
EGR cooling water pump		ECM		
Connector	Terminal	Connector	Terminal	
E203	2	E207	29	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EGR COOLING WATER PUMP

Check EGR cooling water pump. Refer to [EC-1499, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace EGR cooling water pump. Refer to [CO-78, "Removal and Installation"](#).

Component Inspection

INFOID:000000006466668

1.CHECK EGR COOLING WATER PUMP

1. Turn ignition switch OFF.
2. Disconnect EGR cooling water pump harness connector.

P2457 EGR COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

3. Check the resistance between EGR cooling water PUMP terminals.

+	—	Resistance
EGR cooling water pump		
Terminal		
1	2	43 - 49 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR cooling water pump. Refer to [CO-78, "Removal and Installation"](#).

P245A EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P245A EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000006466669

DTC DETECTION LOGIC

NOTE:

If DTC P245A is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P245A	EGR COOLER BYP/V (EGR cooler bypass valve control solenoid valve circuit)	- ECM detects open circuit of EGR cooler bypass valve control solenoid valve circuit for 0.4 second or more while EGR cooler bypass valve control solenoid valve is not actuated while running the engine. - ECM detects short circuit to power supply of EGR cooler bypass valve control solenoid valve circuit for 0.4 second or more while running the engine when EGR cooler bypass valve control solenoid valve actuated. - ECM detects short circuit to ground of EGR cooler bypass valve control solenoid valve circuit for 0.4 second or more when EGR cooler bypass valve control solenoid valve is not actuated while running the engine. - ECM detects EGR cooler bypass valve control solenoid valve does not actuated for 0.5 second or more when EGR cooler bypass valve control solenoid valve actuated.	- Harness or connectors (EGR cooler bypass valve control solenoid valve circuit is open or shorted.) - EGR cooler bypass valve control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine and let it idle at least 1 second while EGR cooling.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1501. "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466670

1.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect EGR cooler bypass valve control solenoid valve harness connector.
- Check the voltage between EGR cooler bypass valve control solenoid valve harness connector and ground.

+		-	Voltage
EGR cooler bypass valve control solenoid valve			
Connector	Terminal		
F90	1	Ground	Battery voltage

Is the inspection result normal?

P245A EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between EGR cooler bypass valve control solenoid valve harness connector and ECM relay harness connector.

+		-		Continuity
EGR cooler bypass valve control solenoid valve		ECM relay		
Connector	Terminal	Connector	Terminal	
F90	1	E214	5	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between EGR cooler bypass valve control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
EGR cooler bypass valve control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F90	2	F62	113	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

Check EGR cooler bypass valve control solenoid valve. Refer to [EC-1503, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace EGR cooler assembly. Refer to [EM-358, "Exploded View"](#).

P245A EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Component Inspection

INFOID:000000006466671

1.CHECK EGR COOLER BYPASS VALVE CONTROL SOLENOID VALVE

- 1. Turn ignition switch ON.
- 2. Disconnect EGR cooler bypass valve control solenoid valve harness connector.
- 3. Check the resistance between EGR cooler bypass valve control solenoid valve terminals.

+	—	Resistance
EGR cooler bypass valve control solenoid valve		
Terminal		
1	2	32 - 60 Ω

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EGR cooler assembly. Refer to [EM-358. "Exploded View"](#).

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P246E CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P246E CAN COMM CIRCUIT

DTC Logic

INFOID:000000006466672

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P246E	CAN COMM CIRCUIT (CAN communication line)	- An excessively low voltage from the sensor is sent to ECM. - An excessively high voltage from the sensor is sent to ECM.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1329, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466673

Perform the trouble diagnosis for CAN communication system. Refer to [LAN-46, "CAN System Specification Chart"](#).

P2505 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2505 ECM POWER SUPPLY

DTC Logic

INFOID:000000006466674

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2505	Ignition signal circuit	Ignition signal is not entered to ECM when ignition switch is turned ON.	• Harness or connectors (Ignition signal circuit is open or shorted.) • IPDM E/R (Ignition relay)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1505, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466675

1. ECM POWER SUPPLY (IGNITION)

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

+		-	Voltage
ECM			
Connector	Terminal		
E207	18	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. ECM POWER SUPPLY CIRCUIT (IGNITION)

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E207	18	E12	17	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PG-34, "Removal and Installation of IPDM E/R"](#).

P2505 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

3.CHECK ECM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent Incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

P253F ENGINE OIL DETERIORATED

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P253F ENGINE OIL DETERIORATED

DTC Logic

INFOID:000000006466676

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P253F	ENG OIL DETERIORATED (Engine oil deteriorated)	When engine oil is too much quantity.	Too much engine oil

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1507, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466677

1. CHECK ENGINE OIL LEVEL

Check the engine oil level. Refer to [LU-35, "Inspection"](#).

CAUTION:

If after performed service regeneration, exchange the engine oil and engine oil filter.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Drain or refill engine oil. Refer to [LU-36, "Draining"](#) or [LU-36, "Refilling"](#).

2. CHECK OIL LEVEL SENSOR

Check oil level sensor. Refer to [EM-320, "Exploded View"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace engine oil temperature/level sensor. Refer to [EM-320, "Exploded View"](#).

P2600 TC COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

P2600 TC COOLING PUMP

DTC Logic

INFOID:000000006466678

DTC DETECTION LOGIC

NOTE:

If DTC P2600 is displayed with DTC P0685, first perform the trouble diagnosis for DTC P0685.

Refer to [EC-1455, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2600	TC COOLING PUMP (Turbocharger cooling water pump circuit)	- ECM detects open circuit of turbocharger cooling water pump circuit for 0.4 second or more. - ECM detects short circuit to power supply of turbocharger cooling water pump circuit for 0.4 second or more. - ECM detects short circuit to ground of turbocharger cooling water pump circuit for 0.4 second or more. - ECM detects turbocharger cooling water pump does not actuated for 0.5 second or more.	- Harness or connectors (Turbocharger cooling water pump circuit is open or shorted.) - Turbocharger cooling water pump - Turbocharger cooling water pump relay

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 4 minutes.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1508, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start the engine let it idle at least 1 second.
- Turn ignition switch OFF and wait at least 4 minutes.
- Turn ignition switch ON and wait at least 1 second.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC-1508, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006466679

1. CHECK TURBOCHARGER COOLING WATER PUMP POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect turbocharger cooling water pump harness connector.
- Check the voltage between turbocharger cooling water pump harness connector and ground.

+		–	Voltage
Turbocharger cooling water pump			
Connector	Terminal		
E205	1	Ground	Battery voltage

Is the inspection result normal?

P2600 TC COOLING PUMP

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK TURBOCHARGER COOLING WATER PUMP POWER SUPPLY CIRCUIT

1. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
2. Check the continuity between turbocharger cooling water pump harness connector and ECM relay harness connector.

+		-		Continuity
Turbocharger cooling water pump		ECM relay		
Connector	Terminal	Connector	Terminal	
E205	1	E214	5	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER COOLING WATER PUMP GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between turbocharger cooling water pump harness connector and ECM harness connector.

+		-		Continuity
Turbocharger cooling water pump		ECM		
Connector	Terminal	Connector	Terminal	
E205	2	E207	7	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER COOLING WATER PUMP

Check turbocharger cooling water pump. Refer to [EC-1510, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
NO >> Replace turbocharger cooling water pump. Refer to [CO-77, "Removal and Installation"](#).

P2600 TC COOLING PUMP

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

Component Inspection

INFOID:000000006466680

1. CHECK TURBOCHARGER COOLING WATER PUMP

With CONSULT-III

1. Turn ignition switch ON.
2. Select "ACTIVE TEST" mode of "ENGINE" with CONSULT-III.
3. Perform "TURBOCHARGER COOLING WATER PUMP" of active test item.
4. With operating the test item, check that the turbocharger cooling water pump operate.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect turbocharger cooling water pump harness connector.
3. Check the turbocharger cooling water pump operation as per the following condition.

+	–	Condition	Operation
Turbocharger cooling water pump			
Terminal			
1	2	12 V direct current supply between terminals 1 and 2	Turbocharger cooling water pump operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger cooling water pump. Refer to [CO-77, "Removal and Installation"](#).

ASCD MAIN SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

ASCD MAIN SWITCH

Component Function Check

INFOID:000000006466681

1.CHECK ASCD MAIN SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" with CONSULT-III.
3. Check that the "CRUSE CONT SW" indication as per the following condition.

Monitor item	Condition		Indication
CRUSE CONT SW	ASCD MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E207	90	1	ASCD MAIN switch	Pressed
				Released
				Battery voltage
				0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1511, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466682

1.CHECK ASCD MAIN SWITCH POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check voltage between combination switch (spiral cable) harness connector terminals.

Combination switch (spiral cable)				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
M302	21	M303	7	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK ASCD MAIN SWITCH POWER SUPPLY-II

Check voltage between combination switch (spiral cable) harness connector and ground.

+		-	Voltage
Combination switch (spiral cable)			
Connector	Terminal		
M302	21	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

ASCD MAIN SWITCH

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ASCD MAIN SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M303	7	E207	90	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

5.CHECK ASCD MAIN SWITCH

Check ASCD MAIN switch. Refer to [EC-1512, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

Component Inspection

INFOID:000000006466683

1.CHECK ASCD MAIN SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)				Condition		Continuity
+		-				
Connector	Terminal	Connector	Terminal			
M302	21	M303	7	ASCD MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END

ASCD MAIN SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

- A
- EC
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

SPEED LIMITER MAIN SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

SPEED LIMITER MAIN SWITCH

Component Function Check

INFOID:000000006466684

1.CHECK SPEED LIMITER MAIN SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode in "ENGINE" with CONSULT-III.
3. Check that the "SPEED LIMITER SW" indication as per the following condition.

Monitor item	Condition		Indication
SPEED LIMITER SW	Speed limiter MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	+	-			
	Terminal		Speed limiter MAIN switch	Pressed	Battery voltage
E207	12	1		Released	0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1514, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466685

1.CHECK SPEED LIMITER MAIN SWITCH POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Turn ignition switch ON.
4. Check voltage between combination switch (spiral cable) harness connector terminals.

Combination switch (spiral cable)				Voltage
+		−		
Connector	Terminal	Connector	Terminal	
M302	21	M303	8	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK SPEED LIMITER MAIN SWITCH POWER SUPPLY-II

Check voltage between combination switch (spiral cable) harness connector and ground.

+		-	Voltage
Combination switch (spiral cable)			
Connector	Terminal		
M303	21	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

SPEED LIMITER MAIN SWITCH

[V9X]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK SPEED LIMITER MAIN SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

+		-		Continuity
Combination switch (spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M303	8	E207	12	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or replace error-detected parts.

5.CHECK SPEED LIMITER MAIN SWITCH

Check speed limiter MAIN switch. Refer to [EC-1515. "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace ASCD steering switch. Refer to [EC-1228. "Component Parts Location"](#).

Component Inspection

INFOID:00000000646686

1.CHECK SPEED LIMITER MAIN SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check the continuity between combination switch (spiral cable) harness connector terminals as per the following conditions.

Combination switch (spiral cable)				Condition		Continuity
+		-				
Connector	Terminal	Connector	Terminal			
M302	21	M303	8	Speed limiter MAIN switch	Pressed	Existed
					Released	Not existed

Is the inspection result normal?

YES >> INSPECTION END

SPEED LIMITER MAIN SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Replace ASCD steering switch. Refer to [EC-1228, "Component Parts Location"](#).

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

Component Function Check

INFOID:000000006466687

1.CHECK COOLING FAN FUNCTION

WITH CONSULT-III

1. Start the engine.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
3. Check that cooling fan speed varies according to the percentage.

NOTE:

Speed changes gradually as the percentage changes.

WITHOUT CONSULT-III

1. Start the engine and warm up the engine until engine coolant temperature reaches at least 98°C (209°F).
2. Check that cooling fan speed increase.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1517. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466688

1.CHECK DRIVE BELT

1. Turn ignition switch OFF.
2. Check that the drive belt is not broken.

Is inspection result normal?

YES >> GO TO 2.

NO >> Replace drive belt.Refer to [EM-298. "Removal and Installation"](#).

2.CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING POWER SUPPLY

1. Disconnect electrically-controlled cooling fan coupling harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground.

+		-	Voltage (Approx.)
Electrically-controlled cooling fan coupling			
Connector	Terminal		
F83	1	Ground	Battery voltage

Is inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between electrically-controlled cooling fan coupling harness connector and ground.

+		-	Continuity
Electrically-controlled cooling fan coupling			
Connector	Terminal		
F83	6	Ground	Existed

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

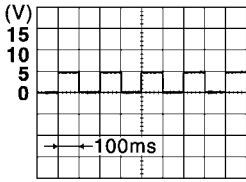
4. CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING CONTROL SIGNAL

With CONSULT-III

1. Start the engine.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ECM" with CONSULT-III.
3. Set the Duty value to 100%.
4. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground.

CAUTION:

Wait for 1 minute or more to measure.

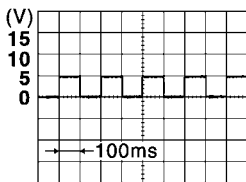
+		-	Voltage (Approx.)
Electrically-controlled cooling fan coupling			
Connector	Terminal		
F83	3	Ground	 JMMIA0404GB 2. 5 V

Without CONSULT-III

1. Start the engine and warm up the engine until engine coolant temperature reaches at least 98°C (209°F).
2. Check the voltage between electrically-controlled cooling fan coupling harness connector and ground.

CAUTION:

Wait for 1 minute or more to measure.

+		-	Voltage (Approx.)
Electrically-controlled cooling fan coupling			
Connector	Terminal		
F83	3	Ground	 JMMIA0404GB 2. 5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 5.

5. CHECK ELECTRICALLY-CONTROLLED COOLING FAN COUPLING CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between electrically-controlled cooling fan coupling harness connector and IPDM E/R harness connector.

ELECTRICALLY-CONTROLLED COOLING FAN COUPLING

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

+		-		Continuity
Electrically-controlled cooling fan coupling		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F83	3	E12	9	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CAN COMMUNICATION

Refer to [LAN-14, "Trouble Diagnosis Flow Chart"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Repair or Replace error-detected parts.

7.CHECK COOLING FAN SPEED SENSOR

Refer to [EC-1418, "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Replace electrically-controlled cooling fan coupling. Refer to [CO-73, "Removal and Installation"](#)

NO >> Repair or replace error-detected parts.

ELECTRONIC CONTROLLED ENGINE MOUNT

Component Function Check

INFOID:000000006466689

1.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT FUNCTION

1. Start the engine and warm it up to normal operating temperature.
2. Selector lever to D range while depressing the brake pedal and parking brake pedal.
CAUTION:
Apply wheel chocks or other tire blocks to the wheels.
3. Disconnect electronic controlled engine mount control solenoid valve harness connector.
4. Check that body vibration increases.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-1520, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466690

1.CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Reconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hose connected to electronic controlled engine mount.
4. Start the engine and let it idle.
5. Check vacuum hose for vacuum existence.

Is the inspection result normal?

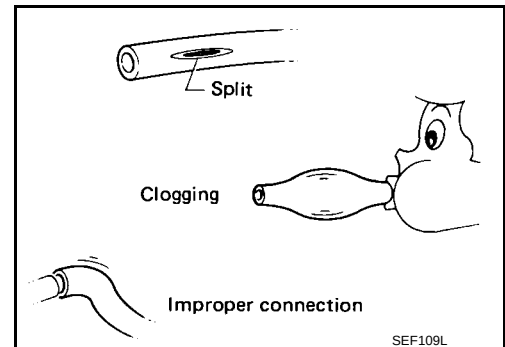
- YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for split, clogging, or improper connection.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace vacuum hoses and vacuum gallery.

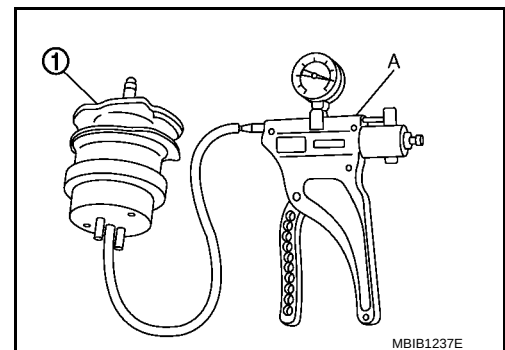


3.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT

1. Install a vacuum pump (A) to electronic controlled engine mount (1).
2. Check that a vacuum is kept when applying the vacuum of – 40kPa (–400mbar, –300mmHg, –11.81inHg) to electronic controlled engine mount.
3. Also visually check electronic controlled engine mount.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace electronic controlled engine mount



4.CHECK VACUUM PUMP

Check vacuum pump. Refer to [EM-302, "Exploded View"](#).

Is the inspection result normal?

ELECTRONIC CONTROLLED ENGINE MOUNT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

- YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).
- NO >> Replace vacuum pump assembly. Refer to [EM-302, "Exploded View"](#).

5.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electronic controlled engine mount control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electronic controlled engine mount control solenoid valve harness connector and ground.

+		-	Voltage
Electronic controlled engine mount control solenoid valve			
Connector	Terminal		
F30	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 6.

6.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Remove ECM relay. Refer to [EC-1228, "Component Parts Location"](#).
3. Check the continuity between electronic controlled engine mount control solenoid valve harness connector and ECM relay harness connector.

+		-		Continuity
Electronic controlled engine mount control solenoid valve		ECM relay		
Connector	Terminal	Connector	Terminal	
F30	1	E214	5	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

7.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between electronic controlled engine mount control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
Electronic controlled engine mount control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F30	2	F62	138	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Repair or replace error-detected parts.

ELECTRONIC CONTROLLED ENGINE MOUNT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

8.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
E207	1	Ground	Existed
	2		
	4		

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE

Check electronic controlled engine mount control solenoid valve. Refer to [EC-1522. "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23. "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace electronic controlled engine mount control solenoid valve. Refer to [EC-1228. "Component Parts Location"](#).

Component Inspection

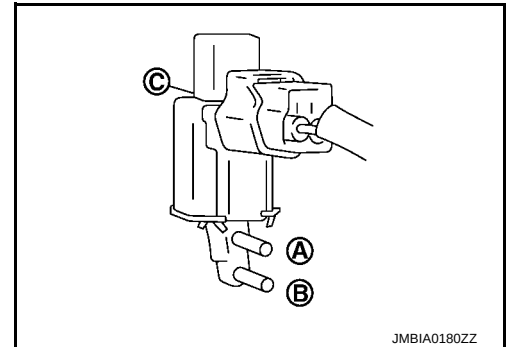
INFOID:000000006466691

1.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE

ⓑ With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hoses connected to electronic controlled engine mount control solenoid valve.
4. Turn ignition switch ON.
5. Select "ACTIVE TEST" mode of "ENGINE" with CONSULT-III.
6. Perform "ENGINE MOUNTING" of active test item.
7. Check air passage continuity and operation delay time as per the following conditions.

Condition (ENGINE MOUNTING)	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
TRVL	Existed	Not existed
IDLE	Not existed	Existed



ⓐ Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hoses connected to electronic controlled engine mount control solenoid valve.

ELECTRONIC CONTROLLED ENGINE MOUNT

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

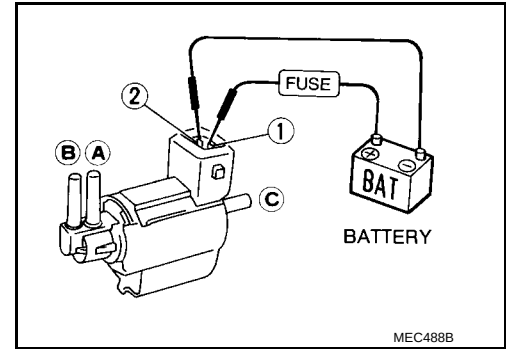
4. Check air passage continuity and operation delay time as per the following conditions.

Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electronic controlled engine mount control solenoid valve. Refer to [EC-1228. "Component Parts Location"](#).



A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

FUEL HEATER

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

FUEL HEATER

Component Function Check

INFOID:000000006466692

1.CHECK FUEL HEATER FUNCTION

Check that fuel heater operate when turn ignition switch ON.

TESTING CONDITION

Always perform test at fuel temperature of 7°C (45°F) or less.

Is fuel heater operated?

YES >> INSPECTION END

NO >> Proceed to [EC-1524. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466693

1.CHECK FUEL HEATER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel heater harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel heater harness connector and ground.

+		-	Voltage
Fuel heater			
Connector	Terminal		
E201	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK FUEL HEATER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between fuel heater harness connector and IPDM E/R harness connector.

+		-		Continuity
Fuel heater		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E201	1	E12	6	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL HEATER GROUND CIRCUIT

1. Check the continuity between fuel heater harness connector and ground.

+		-	Continuity
Fuel heater			
Connector	Terminal		
E201	2	Ground	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

FUEL HEATER

< DTC/CIRCUIT DIAGNOSIS >

[V9X]

NO >> Repair or replace error-detected parts.

4.CHECK FUEL HEATER

Check fuel heater. Refer to [EC-1525, "Component Inspection \(Fuel Heater\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

NO >> Replace fuel filter assembly. Refer to [FL-30, "Removal and Installation"](#).

Component Inspection (Fuel Heater)

INFOID:000000006466694

1.CHECK FUEL HEATER

1. Turn ignition switch OFF.
2. Disconnect fuel heater harness connector.
3. Check the resistance between fuel heater terminals as per the follows.

+	−	Resistance (Approx.)
Fuel heater		
Terminal		
1	2	0.87 Ω

CAUTION:

Always perform the check at fuel heater temperature of 7°C (45°F) or less.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filter assembly. Refer to [FL-30, "Removal and Installation"](#).

GLOW INDICATOR

Component Function Check

INFOID:000000006466695

1.CHECK GLOW INDICATOR FUNCTION

1. Turn ignition switch ON.
2. Check the glow indicator is turned ON, and then glow indication turned OFF.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-1526, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466696

1.CHECK DTC WITH "ECM"

Check the self-diagnosis result with CONSULT-III. Check the ECM does not detect any DTCs. Refer to [EC-1265, "CONSULT-III Function"](#).

Is any DTC detected?

- YES >> Perform trouble diagnosis of detected DTC.
NO >> GO TO 2.

2.CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace malfunctioning parts.

3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check the self-diagnosis result with CONSULT-III. Check the unified meter and A/C amp. does not detect any DTCs. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is any DTC detected?

- YES >> Perform trouble diagnosis of detected DTC.
NO >> GO TO 4.

4.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).
NO >> Repair or replace malfunctioning parts.

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:000000006466697

1.CHECK INFORMATION DISPLAY

1. Start the engine.
2. Press ASCD MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH)
- CAUTION:**
Always drive vehicle at a safe speed.
4. Press SET / – or RES / + switch.
5. Check that the readings of the speedometer show the same values as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1527, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466698

1.CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check the self-diagnosis result with CONSULT-III. Check the unified meter and A/C amp. does not detect any DTCs. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is any DTC detected?

YES >> Perform trouble diagnosis of detected DTC.

NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).

NO >> Repair or replace malfunctioning parts.

INFORMATION DISPLAY (SPEED LIMITER)

Component Function Check

INFOID:000000006466699

1.CHECK INFORMATION DISPLAY (SPEED LIMITER) FUNCTION

1. Start the engine.
2. Press speed limiter MAIN switch.
3. Drive the vehicle at more than 30 km/h (20 MPH).
CAUTION:
Always drive vehicle at a safe speed.
4. Press SET / – or RES / + switch.
5. Perform a test drive on a flat road conditions. Check that the speedometer indicated the same value as the set speed indicator on the information display while depressing the accelerator pedal until just before a kickdown occurs.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC-1528, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466700

1.CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check the self-diagnosis result with CONSULT-III. Check the unified meter and A/C amp. does not detect any DTCs. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is any DTC detected?

YES >> Perform trouble diagnosis of detected DTC.

NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).

NO >> Repair or replace malfunctioning parts.

MALFUNCTION INDICATOR

Component Function Check

INFOID:000000006466701

1.CHECK MALFUNCTION INDICATOR (MI) FUNCTION

1. Turn ignition switch ON.
2. Check that MI illuminates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC-1529, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000006466702

1.CHECK CAN COMMUNICATION LINE

Check CAN communication line. Refer to [LAN-46, "CAN System Specification Chart"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning parts.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check the self-diagnosis result with CONSULT-III. Check the unified meter and A/C amp. does not detect any DTCs. Refer to [DI-14, "CONSULT Function \(METER/M&A\)"](#).

Is any DTC detected?

- YES >> Perform trouble diagnosis of detected DTC.
NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Perform [GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [DI-27, "Removal and Installation of Combination Meter"](#).
NO >> Repair or replace malfunctioning parts.

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:000000006466703

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL									
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Engine body	3	3	3	3	3	3	3		3	4	4		3	EM-342. "Exploded View"
Air cleaner and duct										3	3			EM-300. "Exploded View"
EGR system										3	3			EC-1410. "DTC Log-ic", EC-1412. "DTC Log-ic"
Glow control system	1	1	1						1					EC-1400. "DTC Log-ic", EC-1450. "DTC Log-ic", EC-1453. "DTC Log-ic"

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE		LOW IDLE
Warranty symptom code	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING						AC	
Camshaft position sensor circuit			3	3										EC-1397 , "DTC Log-ic"
Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1331 , "DTC Log-ic"
High pressure fuel pump	5	5	5	5	5	5	5	5		5	5		5	EC-1339 , "DTC Log-ic" , EC-1342 , "DTC Log-ic"
High pressure fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1339 , "DTC Log-ic" , EC-1342 , "DTC Log-ic"
Fuel injector	3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1384 , "DTC Log-ic" , EC-1462 , "DTC Log-ic"
Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1384 , "DTC Log-ic"

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE		LOW IDLE
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Fuel injector adjustment value registration								1	1	1	1			EC-1443. "DTC Log-ic"
Fuel rail pressure sensor circuit		4												EC-1378. "DTC Log-ic"
Fuel rail pressure regulation actuator circuit	4	4	4	4	4	4	4	4		4	4	4	4	EC-1488. "DTC Log-ic"
Fuel pressure holding valve		4												—
Fuel temperature sensor circuit														EC-1375. "DTC Log-ic"
Mass air flow sensor circuit								1		1	1			EC-1345. "DTC Log-ic"
A/F sensor circuit														EC-1360. "DTC Log-ic"
Turbocharger cooling water pump										3	3			EC-1508. "DTC Log-ic"
Turbocharger boost sensor circuit								1		1	1			EC-1390. "DTC Log-ic"

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE		LOW IDLE
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Turbocharger boost control solenoid valve circuit								1		1	1			EC-1336, "DTC Log-ic"
EGR volume control valve circuit								1		1	1			EC-1410, "DTC Log-ic"
EGR cooler bypass valve control solenoid valve circuit														EC-1501, "DTC Log-ic"
EGR cooling water pump circuit														EC-1495, "DTC Log-ic", EC-1498, "DTC Log-ic"
Exhaust gas pressure sensor 1 circuit														EC-1406, "DTC Log-ic"
Exhaust gas temperature sensor 1 circuit														EC-1424, "DTC Log-ic"
Electric throttle control actuator	2	2	2	2	1	1	1			1	1			EC-1468, "DTC Log-ic", EC-1471, "DTC Log-ic"

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM												Reference page			
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL											
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD		HARD TO START WHEN ENGINE IS HOT		AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code	AA				AB			AC	AD	AE		AF				
Accelerator pedal position sensor circuit									1			1	1			EC-1387, "DTC Log-ic", EC-1473, "DTC Log-ic"
Throttle position sensor circuit																EC-1355, "DTC Log-ic"
Vehicle speed signal circuit													1			EC-1415, "DTC Log-ic"
Engine coolant temperature circuit				1		1		1							1	EC-1352, "DTC Log-ic"
Start signal circuit	1	1	1	1	1		1	1		1		1	1			—
Ignition switch circuit		1			1	1	1									—
Power supply for ECM circuit		1				1	1	1								EC-1325, "Diagnosis Procedure"
Refrigerant pressure sensor circuit						2	2	2								EC-1421, "DTC Log-ic"
ECM relay (Self shut-off) circuit		1					1	1	1							EC-1455, "DTC Log-ic"

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system					SYMPTOM										Reference page					
					HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL											
Warranty symptom code					AA				AB			AC	AD	AE		AF				
ECM					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1440, "DTC Log-ic", EC-1441, "DTC Log-ic", EC-1442, "DTC Log-ic", EC-1444, "DTC Log-ic", EC-1445, "DTC Log-ic"
NATS (Nissan Anti-theft System)						1													BL-70	

EC-1440.
"DTC Log-
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EC-1441.
"DTC Log-
ic",
EC-1442.
"DTC Log-
ic",
EC-1444.
"DTC Log-
ic",
EC-1445.
"DTC Log-
ic"

1 - 5: The numbers refer to the order of inspection.
(continued on next page)

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM											Reference page
	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-III?	
Warranty symptom code	AG	AH	AJ	AK	AL	AM	AP		HA			
Engine body		3	3	3	3	1		3				EM-342. "Exploded View"
Air cleaner and duct							3					EM-300. "Exploded View"
EGR system							3					EC-1410. "DTC Log-ic" , EC-1412. "DTC Log-ic" ,
Glow control system								1				EC-1400. "DTC Log-ic" , EC-1450. "DTC Logic", EC-1453. "DTC Log-ic"
Camshaft position sensor circuit										1	1	EC-1397. "DTC Log-ic"
Crankshaft position sensor circuit	1	1								1	1	EC-1331. "DTC Log-ic"
High pressure fuel pump	5	5	5		5					1	1	EC-1339. "DTC Log-ic" , EC-1342. "DTC Log-ic"
High pressure fuel pump circuit	4	4	4		4					1	1	EC-1339. "DTC Log-ic" , EC-1342. "DTC Log-ic"

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM										Reference page	
	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.		Can be detected by CONSULT-III?
Warranty symptom code	AG	AH	AJ	AK	AL	AM	AP		HA			
Fuel injector	3	3	3		4		3	3		1	1	EC-1384, "DTC Log-ic", EC-1462, "DTC Logic"
Fuel injector circuit	1	1	1		1		1	1		1	1	EC-1384, "DTC Log-ic"
Fuel injector adjustment value registration	1	1					1	1			1	EC-1443, "DTC Log-ic"
Fuel rail pressure sensor circuit										1	1	EC-1378, "DTC Log-ic"
Fuel rail pressure regulation actuator circuit	4	4	4		4							EC-1488, "DTC Log-ic"
Fuel pressure holding valve												—
Fuel temperature sensor circuit												EC-1375, "DTC Log-ic"
Mass air flow sensor circuit							1			1	1	EC-1345, "DTC Log-ic"
A/F sensor circuit										1	1	EC-1360, "DTC Log-ic"
Turbocharger cooling water pump												EC-1508, "DTC Log-ic"
Turbocharger boost sensor circuit										1	1	EC-1390, "DTC Log-ic"
Turbocharger boost control solenoid valve circuit							1	1				EC-1336, "DTC Log-ic"

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM										Reference page	
	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.		Can be detected by CONSULT-III?
Warranty symptom code	AG	AH	AJ	AK	AL	AM	AP		HA			
EGR volume control valve circuit							1					EC-1410. "DTC Log-ic"
EGR cooler bypass valve control solenoid valve circuit					3		1					EC-1501. "DTC Log-ic"
EGR cooling water pump circuit												EC-1495. "DTC Log-ic" , EC-1498. "DTC Logic"
Exhaust gas pressure sensor 1 circuit												EC-1406. "DTC Log-ic"
Exhaust gas temperature sensor 1 circuit										1	1	EC-1424. "DTC Log-ic"
Electric throttle control actuator										1	1	EC-1468. "DTC Log-ic" , EC-1471. "DTC Logic"
Accelerator pedal position sensor circuit			1							1	1	EC-1387. "DTC Log-ic" , EC-1473. "DTC Log-ic"
Throttle position sensor circuit										1	1	EC-1355. "DTC Log-ic"
Vehicle speed signal circuit										1	1	EC-1415. "DTC Log-ic"
Engine coolant temperature circuit	1	1		1						1	1	EC-1352. "DTC Log-ic"
Start signal circuit												—

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[V9X]

SYSTEM — Basic engine control system	SYMPTOM										Reference page	
	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.		Can be detected by CONSULT-III?
Warranty symptom code	AG	AH	AJ	AK	AL	AM	BLACK SMOKE	WHITE SMOKE	HA			
Ignition switch circuit												—
Power supply for ECM circuit										1	1	EC-1325 , "Diagnosis Procedure"
Refrigerant pressure sensor circuit			3		4							EC-1421 , "DTC Log-ic"
ECM relay (Self shut-off) circuit											1	EC-1455 , "DTC Log-ic"
ECM	2	2	2	2	2	2	2	2	2	2	2	EC-1440 , "DTC Log-ic", EC-1441 , "DTC Log-ic", EC-1442 , "DTC Log-ic", EC-1444 , "DTC Log-ic", EC-1445 , "DTC Log-ic"
NATS (Nissan Anti-theft System)											1	BL-70

1 - 5: The numbers refer to the order of inspection.

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:000000006466704

1. CHECK IDLE SPEED

With CONSULT-III

Check "ENG SPEED" in "DATA MONITOR" mode with CONSULT-III.

With GST

Check idle speed with Service \$01 of GST.

Idle speed: Refer to [EC-1545, "Idle Speed"](#).

>> INSPECTION END

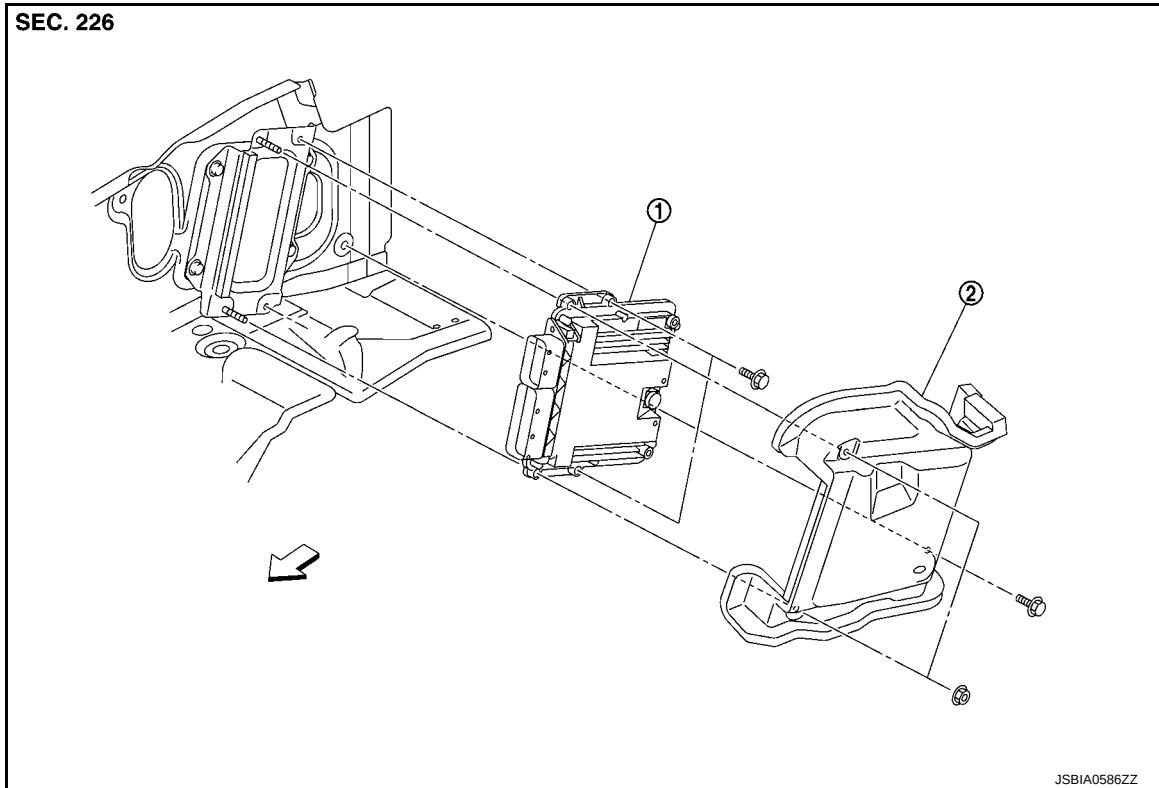
REMOVAL AND INSTALLATION

ECM

Exploded View

INFOID:000000006466705

EC



1. Engine control module

2. Engine control module cover (RHD models)

:Vehicle front

Removal and Installation

INFOID:000000006466706

REMOVAL

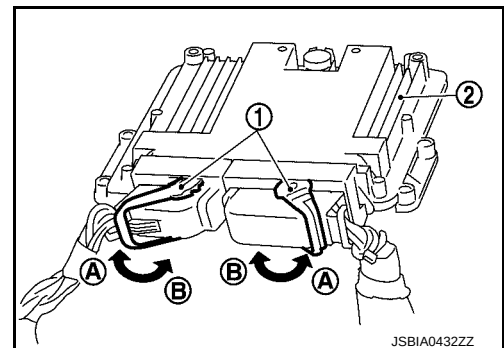
1. Disconnect ECM harness connector.

NOTE:

When disconnecting ECM harness connector (1), loosen (B) it securely with a lever as far as it will go as shown in the figure.

2. ECM

A. Fasten



2. Remove IPDM E/R and IPDM E/R upper covers. Refer to [PG-34, "Removal and Installation of IPDM E/R"](#). (LHD models)
3. Remove fuse and fusible link box. (RHD models)
4. Remove ECM cover. (RHD models)

< REMOVAL AND INSTALLATION >

5. Remove ECM mounting bolts.
6. Remove ECM.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing ECM. Refer to [EC-1313, "Work Procedure"](#).

VACUUM LINES

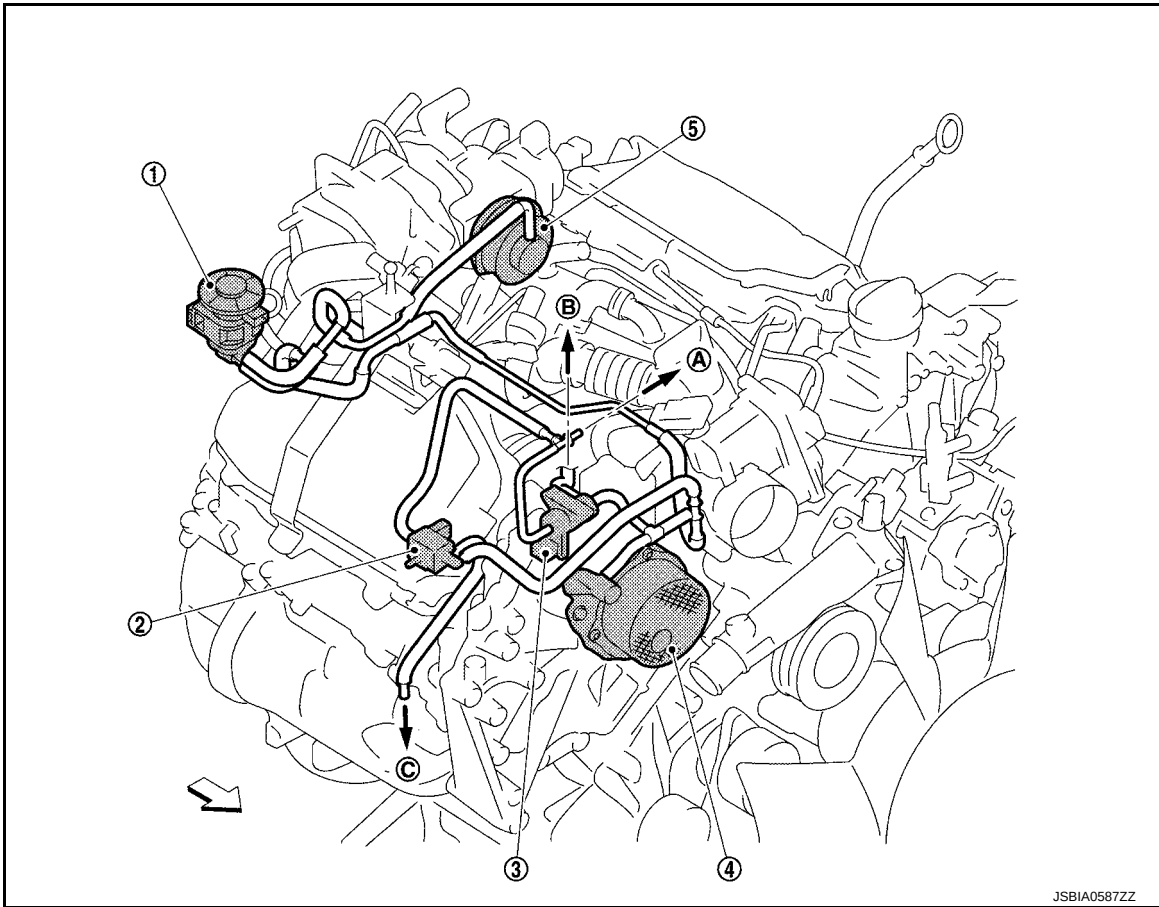
< REMOVAL AND INSTALLATION >

[V9X]

VACUUM LINES

Hydraulic Layout

INFOID:000000006466707



1. Turbocharger boost control solenoid valve	2. Electronic controlled engine mount control solenoid valve	3. EGR cooler bypass valve control solenoid valve
4. Vacuum pump	5. Turbocharger boost control actuator	
A. To intake manifold	B. To EGR cooler bypass valve	C. To electronic controlled engine mount vacuum pipe

⇐ : Vehicle front

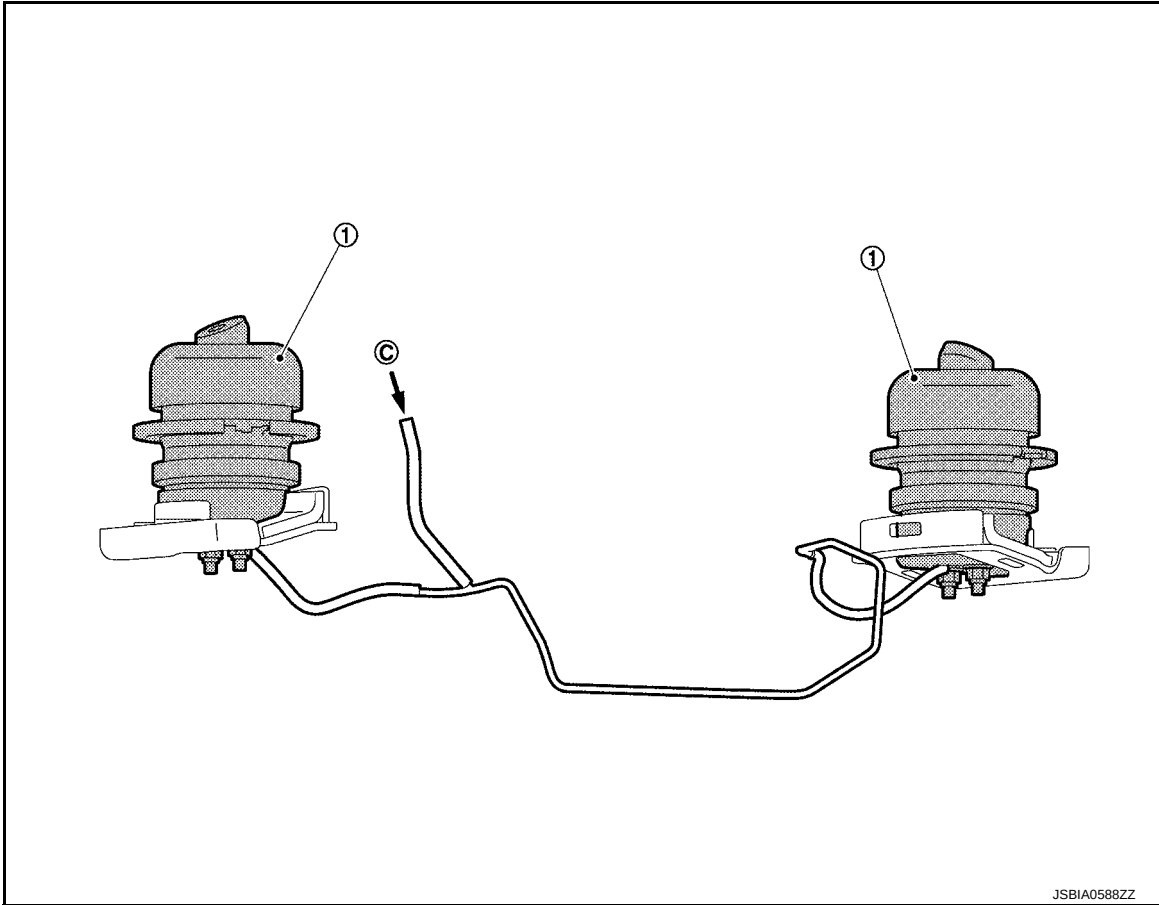
NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

VACUUM LINES

< REMOVAL AND INSTALLATION >

[V9X]

BOTTOM OF THE ENGINE ROOM



- 1. Electronic controlled engine mount
- C. From electronic controlled engine mount control solenoid valve

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

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EC

Condition	Specification
No load* (in Neutral position)	600 ± 50 rpm

- *: Under the following conditions
- A/C switch: OFF
 - Electric load: OFF (Lights, glow plug, heater fan & rear window defogger)
 - Steering wheel: Kept in straight-ahead position