

EC

SECTION

ENGINE CONTROL SYSTEM

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INDEX FOR DTC

PFP:00024

Alphabetical Index

EBS0002P

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the "Type approval number" on the identification plate. Refer to [GI-46, "IDENTIFICATION PLATE"](#).

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-120, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
ABSL PRES SEN/CIRC	P0107	0107	2	×	EC-136
ABSL PRES SEN/CIRC	P0108	0108	2	×	EC-136
APP SEN 1/CIRC	P0227	0227	1	×	EC-222
APP SEN 1/CIRC	P0228	0228	1	×	EC-222
APP SEN 2/CIRC	P1227	1227	1	×	EC-351
APP SEN 2/CIRC	P1228	1228	1	×	EC-351
APP SENSOR	P0226	0226	1	×	EC-213
ATF TEMP SEN/CIRC	P0710	0710	2	×	AT-117
A/T 1ST GR FNCTN	P0731	0731	2	×	AT-132
A/T 2ND GR FNCTN	P0732	0732	2	×	AT-138
A/T 3RD GR FNCTN	P0733	0733	2	×	AT-144
A/T 4TH GR FNCTN	P0734	0734	2	×	AT-150
BRAKE SW/CIRCUIT	P1805	1805	2	—	EC-370
CAN COMM CIRCUIT	U1000	1000*5	1	×	EC-120
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-120
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-241
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-247
CTP LEARNING	P1225	1225	2	—	EC-347
CTP LEARNING	P1226	1226	2	—	EC-349
CYL 1 MISFIRE	P0301	0301	2	×	EC-231
CYL 2 MISFIRE	P0302	0302	2	×	EC-231
CYL 3 MISFIRE	P0303	0303	2	×	EC-231
CYL 4 MISFIRE	P0304	0304	2	×	EC-231
ECM	P0605	0605	1 or 2	×	EC-265
ECM BACK UP/CIRC	P1065	1065	2	×	EC-268
ECT SEN/CIRCUIT	P0117	0117	1	×	EC-146
ECT SEN/CIRCUIT	P0118	0118	1	×	EC-146
ENGINE SPEED SIG	P0725	0725	2	×	AT-128
ENG OVER TEMP	P1217	1217	1	×	EC-326
ETC ACTR	P1121	1121	1 or 2	×	EC-276
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-278
ETC MOT	P1128	1128	1	×	EC-289
ETC MOT PWR	P1124	1124	1	×	EC-284
ETC MOT PWR	P1126	1126	1	×	EC-284
FUEL SYS-LEAN-B1	P0171	0171	2	×	EC-188

INDEX FOR DTC

[CR (WITH EURO-OBD)]

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
FUEL SYS-RICH-B1	P0172	0172	2	×	EC-195
HO2S1 (B1)	P0132	0132	2	×	EC-151
HO2S1 (B1)	P0133	0133	2	×	EC-157
HO2S1 (B1)	P0134	0134	2	×	EC-167
HO2S1 (B1)	P1143	1143	2	×	EC-294
HO2S1 (B1)	P1144	1144	2	×	EC-300
HO2S1 HTR (B1)	P0031	0031	2	×	EC-126
HO2S1 HTR (B1)	P0032	0032	2	×	EC-126
HO2S2 (B1)	P0138	0138	2	×	EC-174
HO2S2 (B1)	P0139	0139	2	×	EC-180
HO2S2 (B1)	P1146	1146	2	×	EC-306
HO2S2 (B1)	P1147	1147	2	×	EC-314
HO2S2 HTR (B1)	P0037	0037	2	×	EC-131
HO2S2 HTR (B1)	P0038	0038	2	×	EC-131
IAT SEN/CIRCUIT	P0112	0112	2	×	EC-141
IAT SEN/CIRCUIT	P0113	0113	2	×	EC-141
INTAKE ERROR	P1171	1171	1	×	EC-322
INT/V TIM CONT-B1	P0011	0011	2	—	EC-123
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-272
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-237
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-237
L/PRESS SOL/CIRC	P0745	0745	2	×	AT-163
MULTI CYL MISFIRE	P0300	0300	2	×	EC-231
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-52
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	Flashing*4	EC-53
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	—
O/R CLTCH SOL/CIRC	P1760	1760	2	×	AT-185
PNP SW/CIRC	P0705	0705	2	×	AT-111
P-N POS SW/CIRCUIT*9	P1706	1706	2	×	EC-364
PURG VOLUME CONT/V	P0444	0444	2	×	EC-257
SFT SOL A/CIRC	P0750	0750	1	×	AT-170
SFT SOL B/CIRC	P0755	0755	1	×	AT-175
SENSOR POWER/CIRC	P1229	1229	1	×	EC-360
TCC SOLENOID/CIRC	P0740	0740	2	×	AT-158
TP SEN/CIRC A/T	P1705	1705	1	×	AT-180
TP SEN 1/CIRC	P0222	0222	1	×	EC-207
TP SEN 1/CIRC	P0223	0223	1	×	EC-207
TP SEN 2/CIRC	P1223	1223	1	×	EC-341
TP SEN 2/CIRC	P1224	1224	1	×	EC-341

INDEX FOR DTC

[CR (WITH EURO-OBD)]

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
TP SENSOR	P0221	0221	1	×	EC-201
TW CATALYST SYS-B1	P0420	0420	2	×	EC-253
VEH SPD SEN/CIRC	P0720	0720	2	×	AT-123
VEH SPEED SEN/CIRC	P0500	0500	2	×	EC-263

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

*2: These numbers are prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*4: When engine is running.

*5: The troubleshooting for these DTCs needs CONSULT-II.

DTC No. Index

EBS0002Q

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-120, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*4	EC-53
U1000	1000*5	CAN COMM CIRCUIT	1	×	EC-120
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-120
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	—
P0011	0011	INT/V TIM CONT-B1	2	—	EC-123
P0031	0031	HO2S1 HTR (B1)	2	×	EC-126
P0032	0032	HO2S1 HTR (B1)	2	×	EC-126
P0037	0037	HO2S2 HTR (B1)	2	×	EC-131
P0038	0038	HO2S2 HTR (B1)	2	×	EC-131
P0107	0107	ABSL PRES SEN/CIRC	2	×	EC-136
P0108	0108	ABSL PRES SEN/CIRC	2	×	EC-136
P0112	0112	IAT SEN/CIRCUIT	2	×	EC-141
P0113	0113	IAT SEN/CIRCUIT	2	×	EC-141
P0117	0117	ECT SEN/CIRCUIT	1	×	EC-146
P0118	0118	ECT SEN/CIRCUIT	1	×	EC-146
P0132	0132	HO2S1 (B1)	2	×	EC-151
P0133	0133	HO2S1 (B1)	2	×	EC-157
P0134	0134	HO2S1 (B1)	2	×	EC-167
P0138	0138	HO2S2 (B1)	2	×	EC-174
P0139	0139	HO2S2 (B1)	2	×	EC-180
P0171	0171	FUEL SYS-LEAN-B1	2	×	EC-188
P0172	0172	FUEL SYS-RICH-B1	2	×	EC-195
P0221	0221	TP SENSOR	1	×	EC-201
P0222	0222	TP SEN 1/CIRC	1	×	EC-207
P0223	0223	TP SEN 1/CIRC	1	×	EC-207

INDEX FOR DTC

[CR (WITH EURO-OBD)]

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0226	0226	APP SENSOR	1	×	EC-213
P0227	0227	APP SEN 1/CIRC	1	×	EC-222
P0228	0228	APP SEN 1/CIRC	1	×	EC-222
P0300	0300	MULTI CYL MISFIRE	2	×	EC-231
P0301	0301	CYL 1 MISFIRE	2	×	EC-231
P0302	0302	CYL 2 MISFIRE	2	×	EC-231
P0303	0303	CYL 3 MISFIRE	2	×	EC-231
P0304	0304	CYL 4 MISFIRE	2	×	EC-231
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-237
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-237
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-241
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-247
P0420	0420	TW CATALYST SYS-B1	2	×	EC-253
P0444	0444	PURG VOLUME CONT/V	2	×	EC-257
P0500	0500	VEH SPEED SEN/CIRC	2	×	EC-263
P0605	0605	ECM	1 or 2	× or —	EC-265
P0705	0705	PNP SW/CIRC	2	×	AT-111
P0710	0710	ATF TEMP SEN/CIRC	2	×	AT-117
P0720	0720	VEH SPD SEN/CIRC	2	×	AT-123
P0725	0725	ENGINE SPEED SIG	2	×	AT-128
P0731	0731	A/T 1ST GR FNCTN	2	×	AT-132
P0732	0732	A/T 2ND GR FNCTN	2	×	AT-138
P0733	0733	A/T 3RD GR FNCTN	2	×	AT-144
P0734	0734	A/T 4TH GR FNCTN	2	×	AT-150
P0740	0740	TCC SOLENOID/CIRC	2	×	AT-158
P0745	0745	L/PRESS SOL/CIRC	2	×	AT-163
P0750	0750	SFT SOL A/CIRC	1	×	AT-170
P0755	0755	SFT SOL B/CIRC	1	×	AT-175
P1065	1065	ECM BACK UP/CIRC	2	×	EC-268
P1111	1111	INT/V TIM V/CIR-B1	2	×	EC-272
P1121	1121	ETC ACTR	1 or 2	×	EC-276
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-278
P1124	1124	ETC MOT PWR	1	×	EC-284
P1126	1126	ETC MOT PWR	1	×	EC-284
P1128	1128	ETC MOT	1	×	EC-289
P1143	1143	HO2S1 (B1)	2	×	EC-294
P1144	1144	HO2S1 (B1)	2	×	EC-300
P1146	1146	HO2S2 (B1)	2	×	EC-306
P1147	1147	HO2S2 (B1)	2	×	EC-314
P1171	1171	INTAKE ERROR	1	×	EC-322
P1217	1217	ENG OVER TEMP	1	×	EC-326
P1223	1223	TP SEN 2/CIRC	1	×	EC-341

INDEX FOR DTC

[CR (WITH EURO-OBD)]

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1224	1224	TP SEN 2/CIRC	1	×	EC-341
P1225	1225	CTP LEARNING	2	—	EC-347
P1226	1226	CTP LEARNING	2	—	EC-349
P1227	1227	APP SEN 2/CIRC	1	×	EC-351
P1228	1228	APP SEN 2/CIRC	1	×	EC-351
P1229	1229	SENSOR POWER/CIRC	1	×	EC-360
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EC-52
P1705	1705	TP SEN/CIRC A/T	1	×	AT-180
P1706	1706	P-N POS SW/CIRCUIT*9	2	×	EC-364
P1760	1760	O/R CLTCH SOL/CIRC	2	×	AT-185
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-370

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

*2: These numbers are prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*4: When engine is running.

*5: The troubleshooting for these DTCs needs CONSULT-II.

PRECAUTIONS

PFP:00001

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

EBS000S5

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 SRS and SB section 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 SRS section.
- 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 harness connectors.

Maintenance Information

EBS00R4X

If any of following part is replaced, always replace with new* one.

If it's not (or fail to do so), the electrical system may not be operated properly.

*: New one means a virgin control unit that has never been energized on-board.

RHD MODELS

- BCM (Models without Intelligent Key system)
- Intelligent Key unit (Models with Intelligent Key system)
- ECM
- IPDM E/R
- Combination meter
- EPS control unit

LHD MODELS

- BCM (Models without Intelligent Key system)
- Intelligent Key unit (Models with Intelligent Key system)
- ECM

On Board Diagnostic (OBD) System of Engine and A/T

EBS00O2S

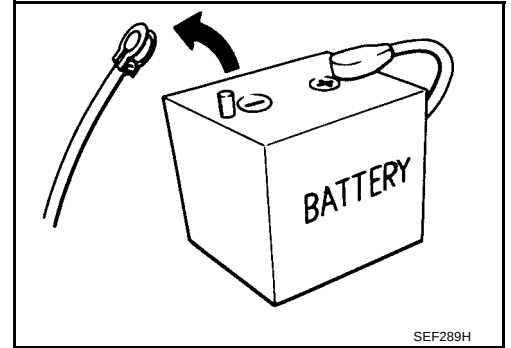
The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

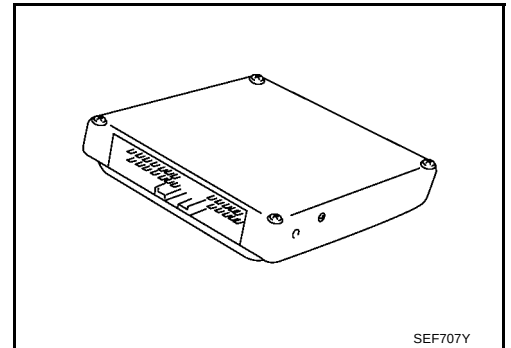
- Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) 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-81, "HARNESS CONNECTOR"](#).
- Be sure 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.
- Be sure 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 injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

Precaution

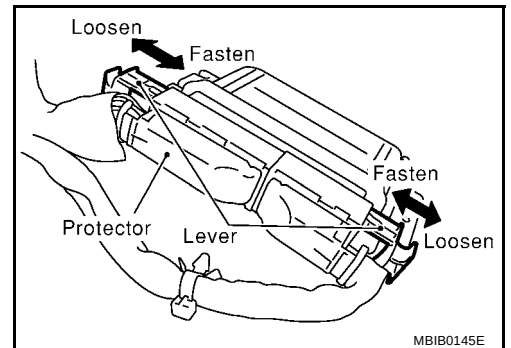
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage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



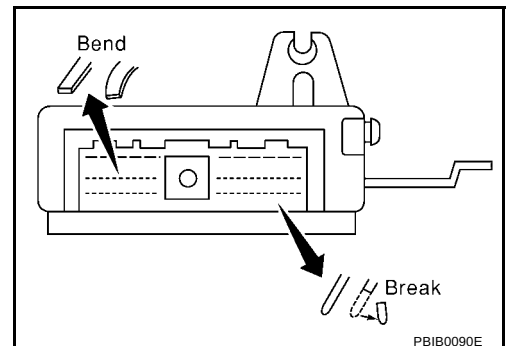
- Do not disassemble ECM.
- If battery cable is disconnected, the memory will return to the initial ECM values.
The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.



- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown at right.



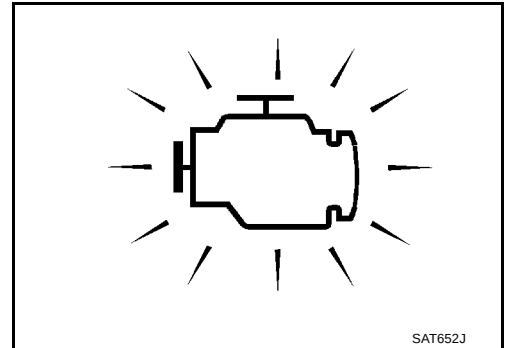
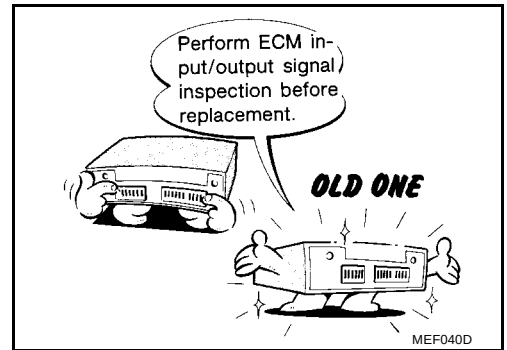
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely 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.



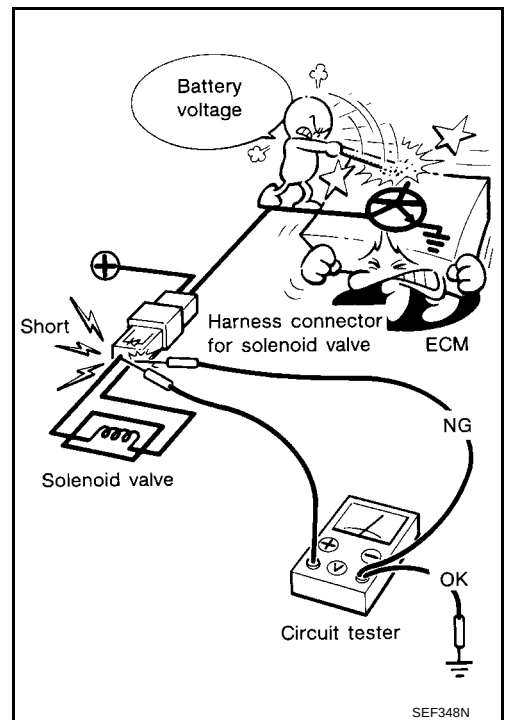
PRECAUTIONS

[CR (WITH EURO-OBD)]

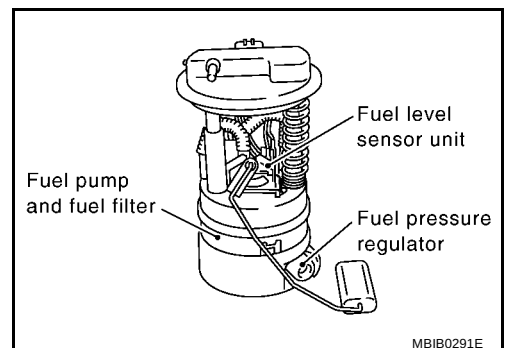
- Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to [EC-84, "ECM Terminals and Reference Value"](#).
- Handle manifold absolute pressure sensor carefully to avoid damage.
- Do not clean air clear element with any type of detergent.
- 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, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
- 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.



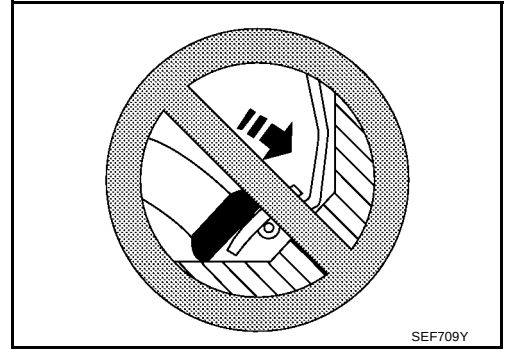
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



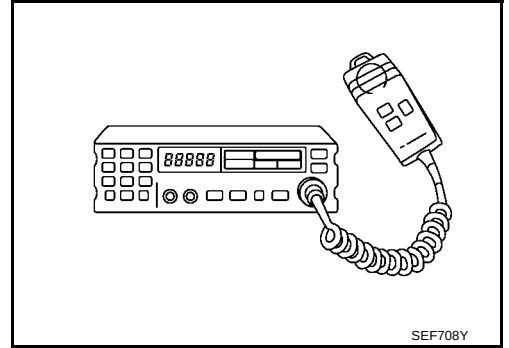
PRECAUTIONS

[CR (WITH EURO-OBD)]

- 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.



EBS0002U

Wiring Diagrams and Trouble Diagnosis

When you read wiring diagrams, refer to the following:

- [GI-14, "How to Read Wiring Diagrams"](#)
- [PG-4, "POWER SUPPLY ROUTING"](#) for power distribution circuit

When you perform trouble diagnosis, refer to the following:

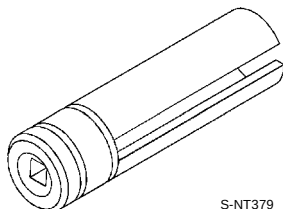
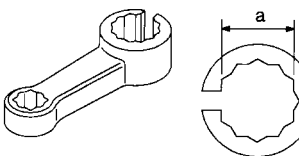
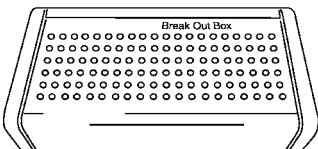
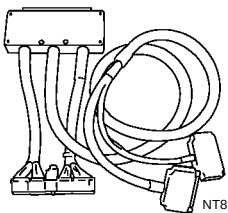
- [GI-11, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"](#)
- [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#)

PREPARATION

PFP:00002

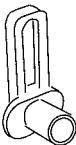
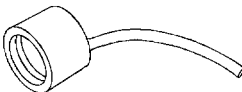
Special Service Tools

EBS0002V

Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors a: 22 mm (0.87 in)
KV109E0010 Break-out box	 NT825	Measuring ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 NT826	Measuring ECM signals with a circuit tester

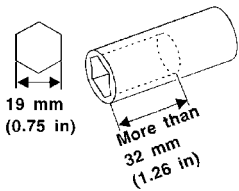
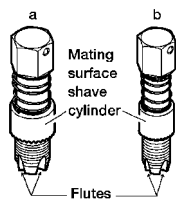
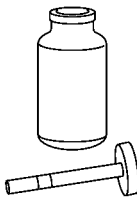
Commercial Service Tools

EBS0002W

Tool name	Description	
Quick connector release	 PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter	 S-NT653	Checking fuel tank vacuum relief valve opening pressure

PREPARATION

[CR (WITH EURO-OBD)]

Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 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

PFP:23710

System Diagram

EBS0002X

A

EC

C

D

E

F

G

H

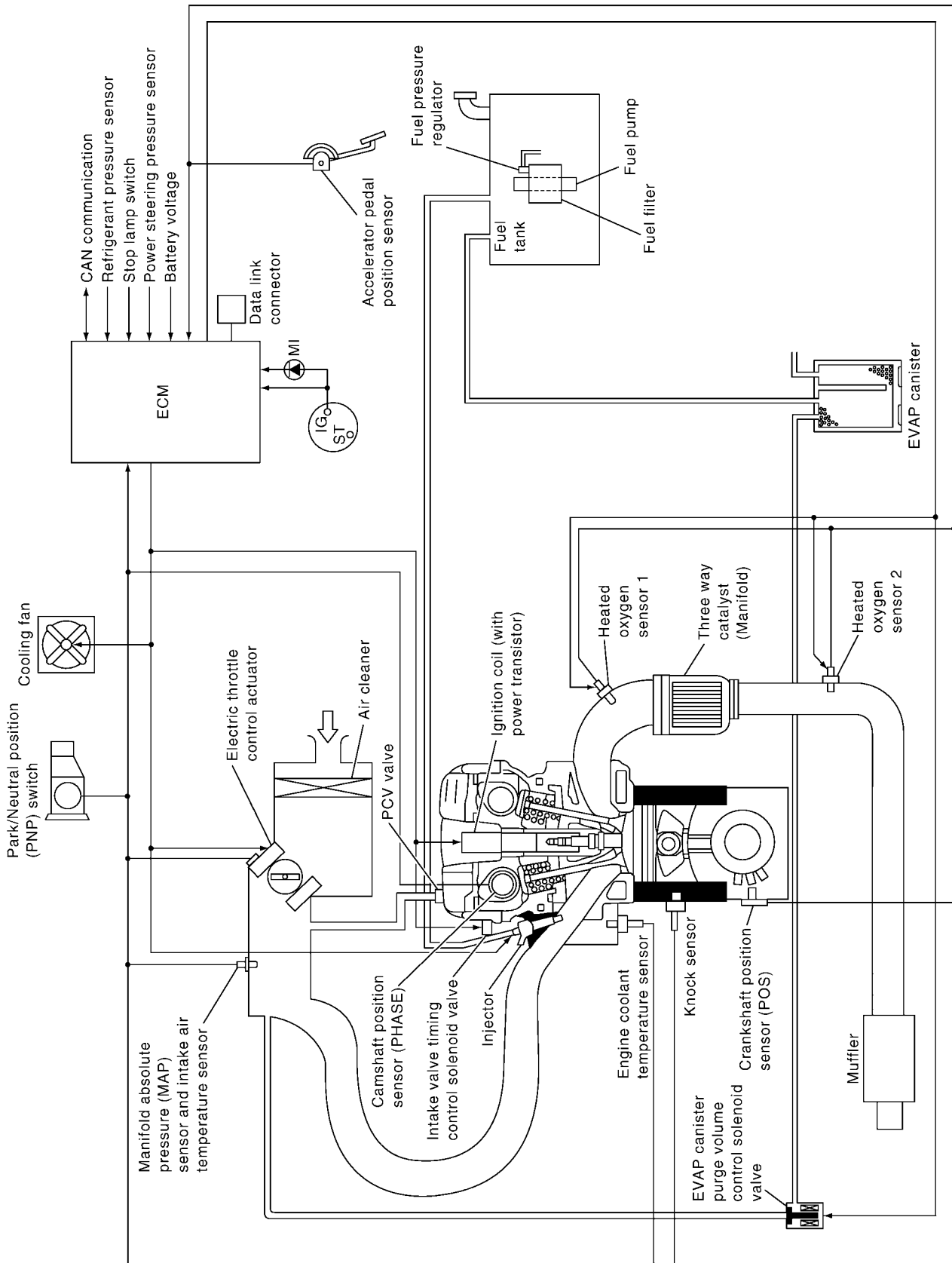
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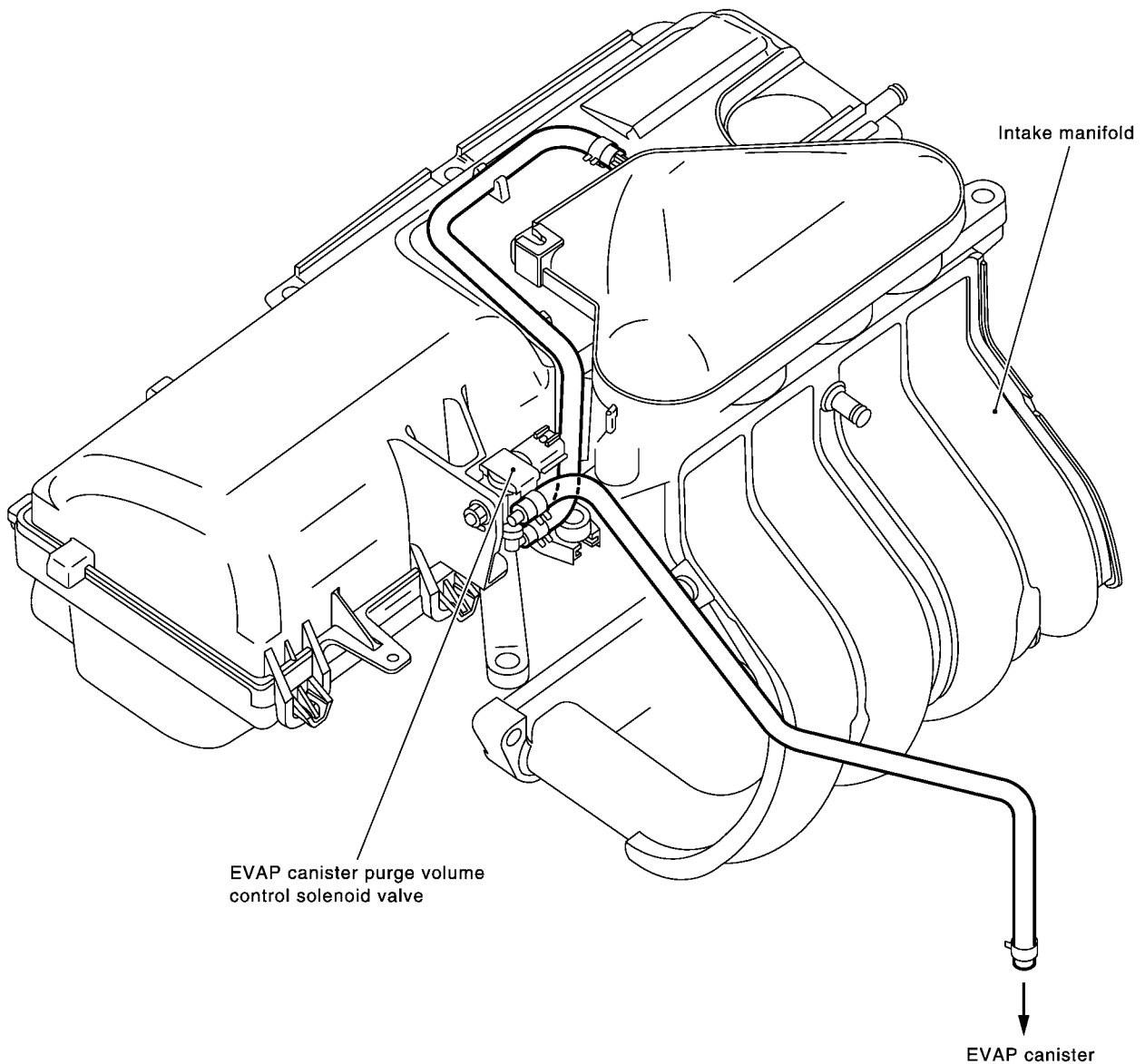
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MBIB0266E

Vacuum Hose Drawing

EBS0002Y



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

Refer to [EC-21, "System Diagram"](#) for Vacuum Control System.

MBIB0265E

System Chart

EBS0002Z

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Manifold absolute pressure sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Stop lamp switch ● Heated oxygen sensor 2 *¹ ● TCM (Transmission control module) ● ABS control unit*² ● Air conditioner switch*² ● Vehicle speed signal*² ● Electrical load signal*²	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	Idle speed control	Electric throttle control actuator
	On board diagnostic system	MI (On the instrument panel)
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay * ³
	Cooling fan control	Cooling fan relays * ³

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

*2: These input signals are sent to the ECM through CAN communication line.

*3: These output signals are sent from the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL CHART

EBS00030

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed * ³ and piston position	Fuel injection & mixture ratio control	Fuel injectors
Manifold absolute pressure sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage * ³		
Heated oxygen sensor 2 * ¹	Density of oxygen in exhaust gas		
Vehicle speed signal * ²	Vehicle speed		
Air conditioner switch * ²	Air conditioner operation		

*1: Under normal conditions, this sensor is not for engine control operation.

*2: These signals are 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 volume) from the crankshaft position sensor, the manifold absolute pressure sensor and intake air temperature 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.

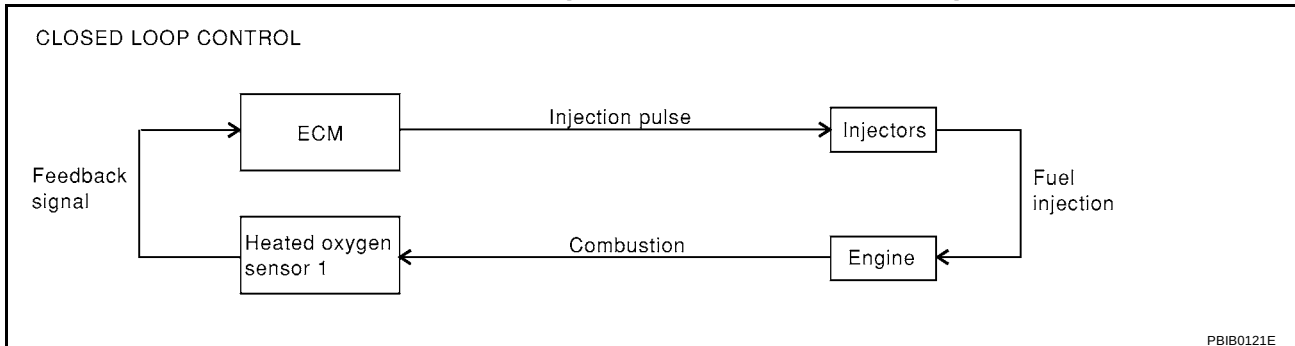
<Fuel increase>

- 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 heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to [EC-151](#). 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 heated oxygen 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 heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen 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 heated oxygen 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 orig-

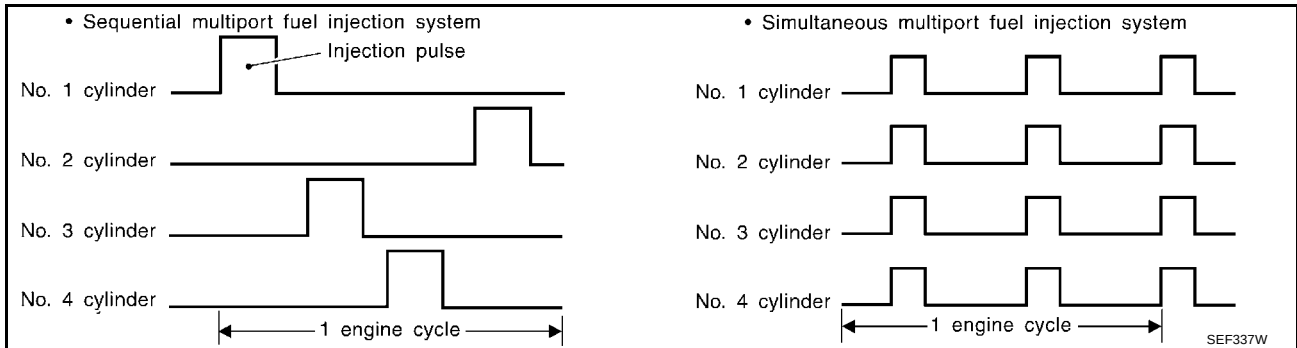
inally designed. Both manufacturing differences (i.e., manifold absolute pressure sensor silicon diaphragm) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio. Accordingly, the difference between the basic and theoretical mixture ratios is monitored in 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 heated oxygen 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 Multipoint 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 Multipoint Fuel Injection System

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

The four 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.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

EBS00031

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed * ² and piston position	Ignition timing control	Power transistor
manifold absolute pressure 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		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage * ²		
Vehicle speed signal * ¹	Vehicle speed		

*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

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. This data forms the map shown.

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.

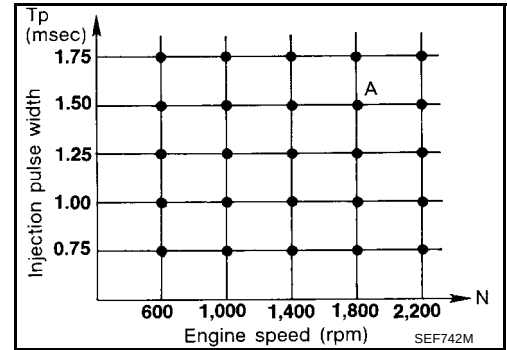
e.g., N: 1,800 rpm, Tp: 1.50 msec

A °BTDC

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.



Air Conditioning Cut Control INPUT/OUTPUT SIGNAL CHART

EBS00032

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch *1	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed *2		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Vehicle speed signal *1	Vehicle speed		
Battery	Battery voltage		

*1: These signals are 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

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 engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

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

INPUT/OUTPUT SIGNAL CHART

EBS00033

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injectors
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed signal* ¹	Vehicle speed		

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

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed 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 operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, [EC-23](#).

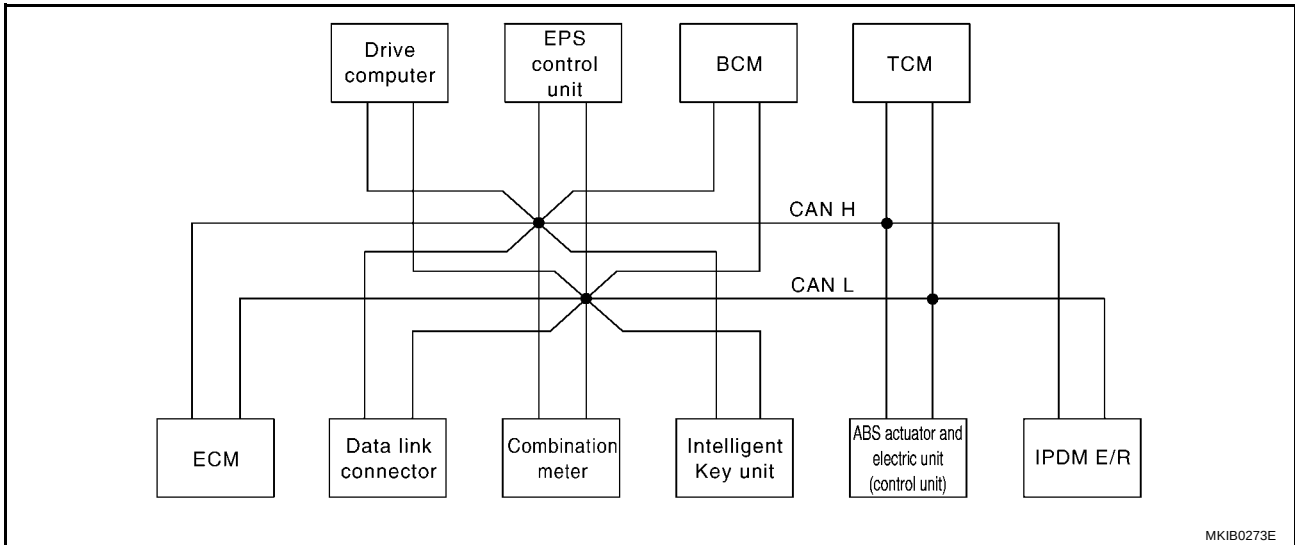
CAN Communication Unit SYSTEM DESCRIPTION

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.

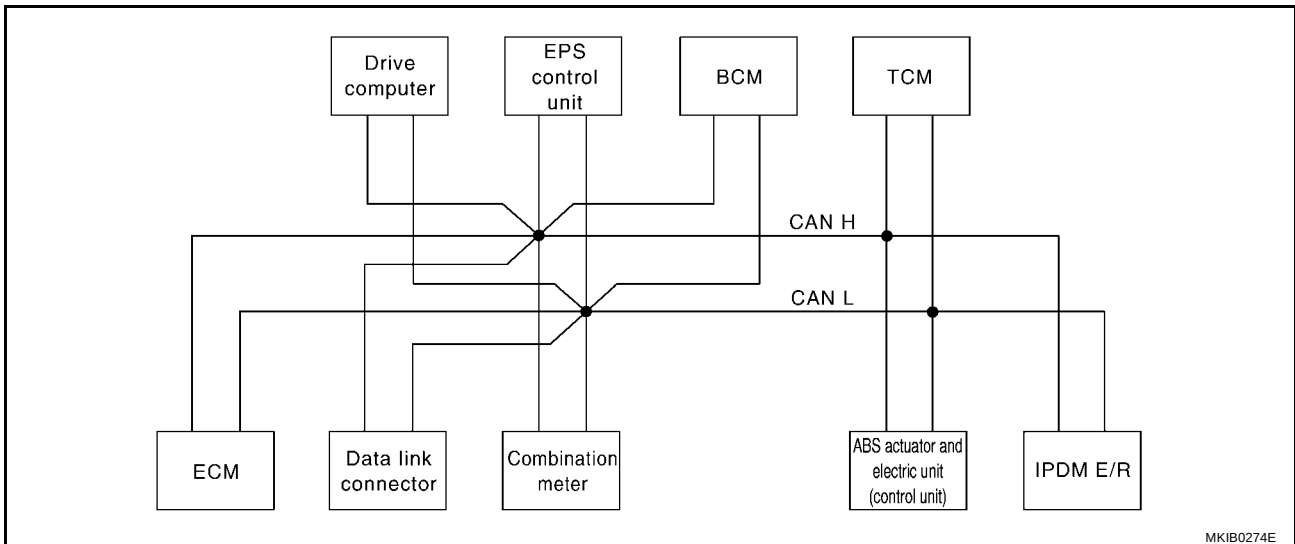
A/T MODELS

System diagram

- Models with Intelligent Key system



- Models without Intelligent Key system



Input/output signal chart

T: Transmit R: Receive

ENGINE CONTROL SYSTEM

[CR (WITH EURO-OBD)]

Signals	ECM	Combination meter.	Intelligent Key unit	Drive computer	EPS control unit	BCM	ABS actuator and electric unit (control unit)	TCM	IPDM E/R
Engine speed signal	T	R		R	R				
Engine coolant temperature signal	T	R							
A/T self-diagnosis signal	R							T	
Output shaft revolution signal	R							T	
Accelerator pedal position signal	T							R	
Closed throttle position signal	T							R	
Wide open throttle position signal	T							R	
A/T shift position signal		R						T	
Stop lamp switch signal		T						R	
O/D OFF indicator lamp signal		R						T	
Engine and A/T integrated control signal	T							R	
	R							T	
Fuel consumption monitor signal	T	R							
Oil pressure switch signal		R		R					T
A/C compressor request signal	T								R
Heater fan switch signal	R					T			
Cooling fan speed request signal	T								R
Cooling fan speed status signal	R								T
Position lights request signal		R		R		T			R
Position light status signal	R								T
Low beam request signal						T			R
Low beam status signal	R								T
High beam request signal		R				T			R
High beam status signal	R								T
Day time light request signal						T			R
Vehicle speed signal	R	R			R		T		
	R	T	R	R	R	R			
Sleep/wake up signal		R	R			T			R
Door switch signal		R	R	R		T			R
Turn indicator signal		R				T			
Buzzer output signal		R				T			
		R	T						
MI signal	T	R		R					
Front wiper request signal						T			R
Front wiper stop position signal						R			T
Rear window defogger switch signal						T			R
Rear window defogger control signal	R								T
Drive computer signal		T		R					

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ENGINE CONTROL SYSTEM

[CR (WITH EURO-OBD)]

Signals	ECM	Combination meter.	Intelligent Key unit	Drive computer	EPS control unit	BCM	ABS actuator and electric unit (control unit)	TCM	IPDM E/R
EPS warning lamp signal		R		R	T				
ABS warning lamp signal		R		R			T		
ABS operation signal	R						T		
Brake warning lamp signal		R		R			T		
Buck-up lamp signal					R	T			
Fuel low warning signal		T		R					
Battery charge malfunction signal		T		R					
Air bag system warning signal		T		R					
Brake fluid level warning signal		T		R					
Engine coolant temperature warning signal		T		R					
Front fog lamp request signal		R				T			R
Rear fog lamp status signal		R				T			
Headlamp washer request signal						T			R
Door lock/unlock request signal			R			T			
Door lock/unlock status signal			R			T			
KEY indicator signal		R	T						
LOCK indicator signal		R	T						

ENGINE CONTROL SYSTEM

[CR (WITH EURO-OBDD)]

Signals	ECM	Combina- tion meter.	Intelli- gent Key unit	Drive computer	EPS con- trol unit	BCM	ABS actuator and elec- tric unit (control unit)	IPDM E/ R
Position light status signal	R							T
Low beam request signal						T		R
Low beam status signal	R							T
High beam request signal		R				T		R
High beam status signal	R							T
Day time light request signal						T		R
Vehicle speed signal	R	R			R		T	
	R	T	R	R	R	R		
Sleep/wake up signal		R	R			T		R
Door switch signal		R	R	R		T		R
Turn indicator signal		R				T		
Buzzer output signal		R				T		
		R	T					
MI signal	T	R		R				
Front wiper request signal						T		R
Front wiper stop position signal						R		T
Rear window defogger switch signal						T		R
Rear window defogger control sig- nal	R							T
Drive computer signal		T		R				
EPS warning indicator signal		R		R	T			
ABS warning lamp signal		R		R			T	
ABS operation signal	R			R			T	
Brake warning lamp signal		R					T	
Buck-up lamp signal					R	T		
Fuel low warning signal		T		R				
Battery charge malfunction signal		T		R				
Air bag system warning signal		T		R				
Brake fluid level warning signal		T		R				
Engine coolant temperature warn- ing signal		T		R				
Front fog lamp request signal		R				T		R
Rear fog lamp status signal		R				T		
Headlamp washer request signal						T		R
Door lock/unlock request signal			R			T		
Door lock/unlock status signal			R			T		
KEY indicator signal		R	T					
LOCK indicator signal		R	T					

BASIC SERVICE PROCEDURE

PFP:00018

Idle Speed and Ignition Timing Check IDLE SPEED

EBS00035

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

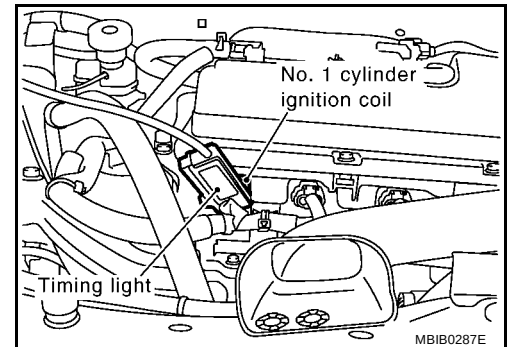
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With GST

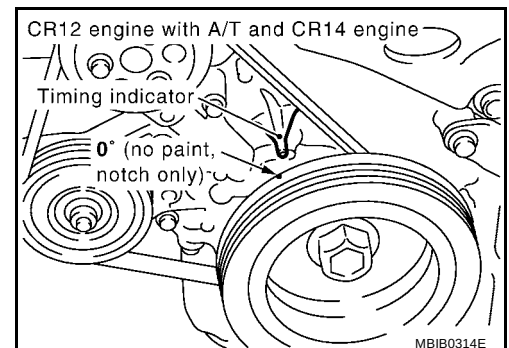
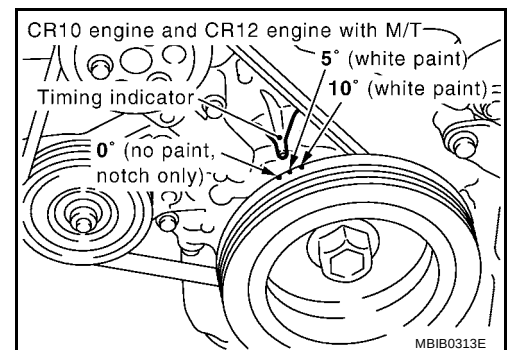
Check idle speed in "MODE 1" with GST.

IGNITION TIMING

1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the wires as shown in the figure.



3. Check ignition timing.



Accelerator Pedal Released Position Learning

EBS00036

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” wait at least 10 seconds.
4. Turn ignition switch “ON” and wait at least 2 seconds.
5. Turn ignition switch “OFF” wait at least 10 seconds.

Throttle Valve Closed Position Learning

EBS00037

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

EBS00038

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 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)
On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
For A/T models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT-II

1. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
2. Perform [EC-34, "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.

BASIC SERVICE PROCEDURE

[CR (WITH EURO-OBD)]

5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.

SELECT WORK ITEM
XXXXXXXXXX
XXXXXXXXXX
IDLE AIR VOL LEARN
XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX

SEF217Z

6. Touch "START" and wait 20 seconds.

WORK SUPPORT	
IDLE AIR VOL LEARN	
MONITOR	
ENG SPEED	XXX rpm
START	

SEF454Y

7. Make sure that "CMPLT" is not displayed on CONSULT-II screen. If "INCMP" is 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
Idle speed	M/T: 650±50 rpm A/T: 700±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 5±5° BTDC A/T: 5±5° BTDC (in "P" or "N" position)

WORK SUPPORT	
IDLE AIR VOL LEARN	CMPLT
MONITOR	
ENG SPEED	XXX rpm
START	

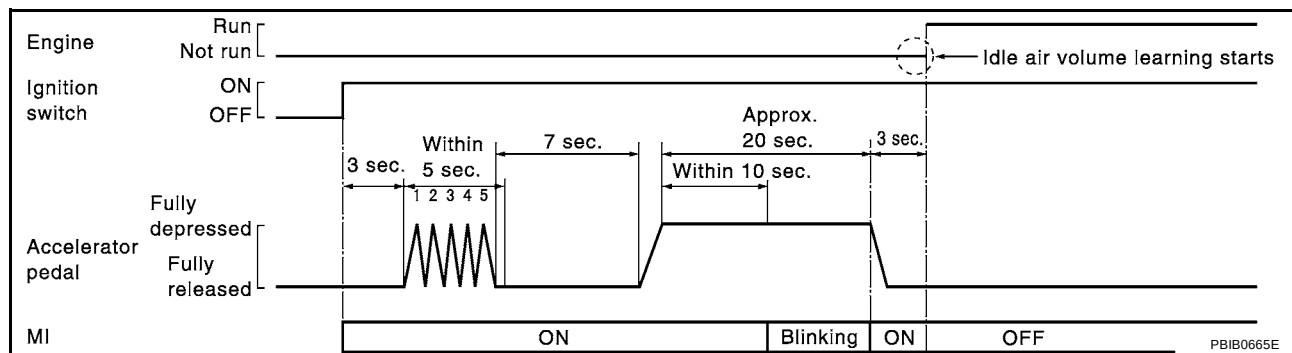
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⊗ Without CONSULT-II

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.
- Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
 - Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
 - Start engine and warm it up to normal operating temperature.
 - Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.
 - Turn ignition switch "OFF" and wait at least 10 seconds.
 - Confirm that accelerator pedal is fully released, turn ignition switch "ON" and wait 3 seconds.
 - Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
 - Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
 - Fully release the accelerator pedal within 3 seconds after the MI goes off.
 - 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: 650±50 rpm A/T: 700±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 5±5° BTDC A/T: 5±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-109, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#).
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 FUEL PRESSURE RELEASE

EBS00039

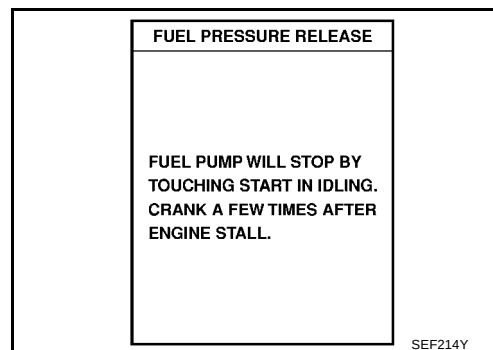
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

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

Ⓟ With CONSULT-II

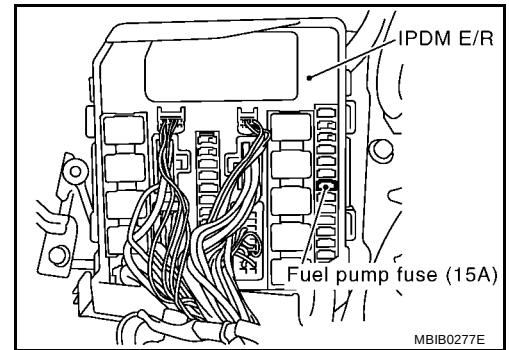
1. Turn ignition switch "ON".
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch "OFF".



SEF214Y

⊗ Without CONSULT-II

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.

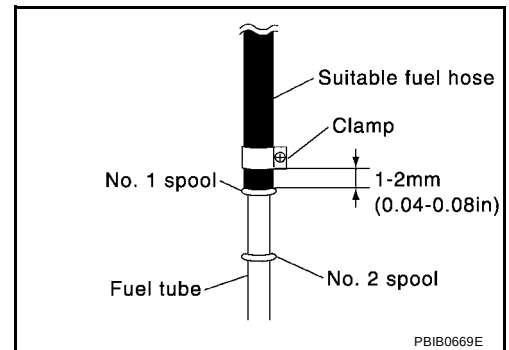


FUEL PRESSURE CHECK

CAUTION:

- 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.
- When installing fuel hose quick connector, refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#).

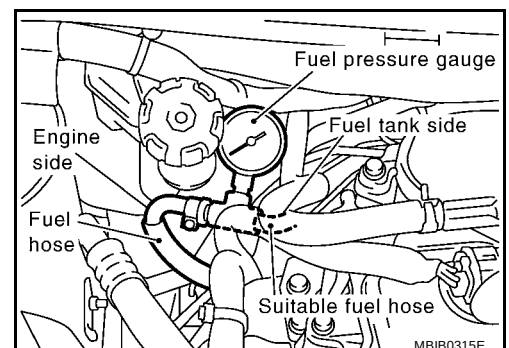
1. Release fuel pressure to zero. Refer to [EC-36, "FUEL PRESSURE RELEASE"](#).
2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
 - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
 - To avoid unnecessary 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-14, "AIR CLEANER AND AIR DUCT"](#).
 - Do not twist or kink fuel hose because it is plastic hose.
 - Do not remove fuel hose from quick connector.
 - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
4. Install the fuel pressure gauge as shown in the figure.
 - 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 and No.1 spool.
 - 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.
 - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
 - 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. 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.
 6. Turn ignition switch "ON", and check for fuel leakage.
 7. Start engine and check for fuel leakage.



8. 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)

9. If result is unsatisfactory, go to next step.
10. 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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS0003A

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)	Mode 3 of ISO 15031-5
Freeze Frame data	Mode 2 of ISO 15031-5
System Readiness Test (SRT) code	Mode 1 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of ISO 15031-5
Calibration ID	Mode 9 of ISO 15031-5

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

x: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	×	×	×	×	×	—
GST	×	×*1	×	—	×	×
ECM	×	×*2	—	—	—	—

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

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

The malfunction indicator (MI) 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-66](#).)

Two Trip Detection Logic

EBS0003B

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 MI 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 MI lights up. The MI 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 MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

x: Applicable —: Not applicable

Items	MI				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 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-10)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up when there is a 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 has malfunction and MI circuit is open by means of operating fail-safe function.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

The fail-safe function also operate when above diagnoses except MI circuit 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 EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

EBS0003C

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*5	—	—	—	EC-120
CAN COMM CIRCUIT	U1001	1001*5	—	—	×	EC-120
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	×	EC-123
HO2S1 HTR (B1)	P0031	0031	×	×	×*4	EC-126
HO2S1 HTR (B1)	P0032	0032	×	×	×*4	EC-126
HO2S2 HTR (B1)	P0037	0037	×	×	×*4	EC-131
HO2S2 HTR (B1)	P0038	0038	×	×	×*4	EC-131
ABSL PRES SEN/CIRC	P0107	0107	—	—	×	EC-136
ABSL PRES SEN/CIRC	P0108	0108	—	—	×	EC-136
IAT SEN/CIRCUIT	P0112	0112	—	—	×	EC-141
IAT SEN/CIRCUIT	P0113	0113	—	—	×	EC-141
ECT SEN/CIRCUIT	P0117	0117	—	—	—	EC-146
ECT SEN/CIRCUIT	P0118	0118	—	—	—	EC-146
HO2S1 (B1)	P0132	0132	×	×	×*4	EC-151
HO2S1 (B1)	P0133	0133	×	×	×*4	EC-157
HO2S1 (B1)	P0134	0134	×	×	×*4	EC-167
HO2S2 (B1)	P0138	0138	×	×	×*4	EC-174
HO2S2 (B1)	P0139	0139	×	×	×*4	EC-180
FUEL SYS-LEAN-B1	P0171	0171	—	—	×	EC-188
FUEL SYS-RICH-B1	P0172	0172	—	—	×	EC-195
TP SENSOR	P0221	0221	—	—	—	EC-201
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-207
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-207
APP SENSOR	P0226	0226	—	—	—	EC-213
APP SEN 1/CIRC	P0227	0227	—	—	—	EC-222
APP SEN 1/CIRC	P0228	0228	—	—	—	EC-222
MULTI CYL MISFIRE	P0300	0300	—	—	×	EC-231
CYL 1 MISFIRE	P0301	0301	—	—	×	EC-231
CYL 2 MISFIRE	P0302	0302	—	—	×	EC-231
CYL 3 MISFIRE	P0303	0303	—	—	×	EC-231
CYL 4 MISFIRE	P0304	0304	—	—	×	EC-231
KNOCK SEN/CIRC-B1	P0327	0327	—	—	×	EC-237
KNOCK SEN/CIRC-B1	P0328	0328	—	—	×	EC-237
CKP SEN/CIRCUIT	P0335	0335	—	—	×	EC-241

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
CMP SEN/CIRC-B1	P0340	0340	—	—	×	EC-247
TW CATALYST SYS-B1	P0420	0420	×	×	×*4	EC-253
PURG VOLUME CONT/V	P0444	0444	—	—	×	EC-257
VEH SPEED SEN/CIRC	P0500	0500	—	—	×	EC-263
ECM	P0605	0605	—	—	—	EC-265
PNP SW/CIRC	P0705	0705	—	—	×	AT-111
ATF TEMP SEN/SIRC	P0710	0710	—	—	×	AT-117
VEH SPD SEN/CIRC	P0720	0720	—	—	×	AT-123
ENGINE SPEED SIG	P0725	0725	—	—	×	AT-128
A/T 1ST GR FNCTN	P0731	0731	—	—	×	AT-132
A/T 2ND GR FNCTN	P0732	0732	—	—	×	AT-138
A/T 3RD GR FNCTN	P0733	0733	—	—	×	AT-144
A/T 4TH GR FNCTN	P0734	0734	—	—	×	AT-150
TCC SOLENOID/CIRC	P0740	0740	—	—	×	AT-158
L/PRESS SOL/CIRC	P0745	0745	—	—	×	AT-163
SFT SOL A/CIRC	P0750	0750	—	—	—	AT-170
SFT SOL B/CIRC	P0755	0755	—	—	—	AT-175
ECM BACK UP/CIRC	P1065	1065	—	—	×	EC-268
INT/V TIM V/CIR-B1	P1111	1111	—	—	×	EC-272
ETC ACTR	P1121	1121	—	—	× or —	EC-276
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-278
ETC MOT PWR	P1124	1124	—	—	—	EC-284
ETC MOT PWR	P1126	1126	—	—	—	EC-284
ETC MOT	P1128	1128	—	—	—	EC-289
HO2S1 (B1)	P1143	1143	×	×	×*4	EC-294
HO2S1 (B1)	P1144	1144	×	×	×*4	EC-300
HO2S2 (B1)	P1146	1146	×	×	×*4	EC-306
HO2S2 (B1)	P1147	1147	×	×	×*4	EC-314
INTAKE ERROR	P1171	1171	—	—	—	EC-322
ENG OVER TEMP	P1217	1217	—	—	—	EC-326
TP SEN 2/CIRC	P1223	1223	—	—	—	EC-341
TP SEN 2/CIRC	P1224	1224	—	—	—	EC-341
CTP LEARNING	P1225	1225	—	—	×	EC-347
CTP LEARNING	P1226	1226	—	—	×	EC-349
APP SEN 2/CIRC	P1227	1227	—	—	—	EC-351
APP SEN 2/CIRC	P1228	1228	—	—	—	EC-351
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-360
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	×	EC-52
TP SEN/CIRC A/T	P1705	1705	—	—	—	AT-180
P-N POS SW/CIRCUIT	P1706	1706	—	—	×	EC-364

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
O/R CLTCH SOL/CIRC	P1760	1760	—	—	×	AT-185
BRAKE SW/CIRCUIT	P1805	1805	—	—	×	EC-370

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

*2: These numbers are prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*4: These are not displayed with GST.

*5: The troubleshooting for these DTCs needs CONSULT-II.

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 MI 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 MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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 MI 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 [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

For malfunctions in which 1st trip DTCs are displayed, refer to [EC-40, "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-II.

1st trip DTC is specified in Mode 7 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI 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 II, refer to [EC-62, "WORK FLOW"](#). 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-II**

 **With GST**

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0740, P0745, etc.

These DTCs are prescribed by ISO 15031-5.

(CONSULT-II also displays the malfunctioning component or system.)

 **No Tools**

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0102, 0340 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-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II 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-II. 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".

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS	TIME		DTC RESULTS	TIME
	CKP SEN/CIRCUIT [P0335]	0		CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

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-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see [EC-95, "Freeze Frame Data and 1st Trip Freeze Frame Data"](#).

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/MI 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.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related 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 [EC-51, "HOW TO ERASE EMIS-SION-RELATED DIAGNOSTIC INFORMATION"](#).

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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 MI 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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P0132
		Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P0134
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
HO2S HTR	1	Heated oxygen sensor 1 heater	P0031, P0032
		Heated oxygen sensor 2 heater	P0037, P0038

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

SRT Set Timing

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	
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 (= MI "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

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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:

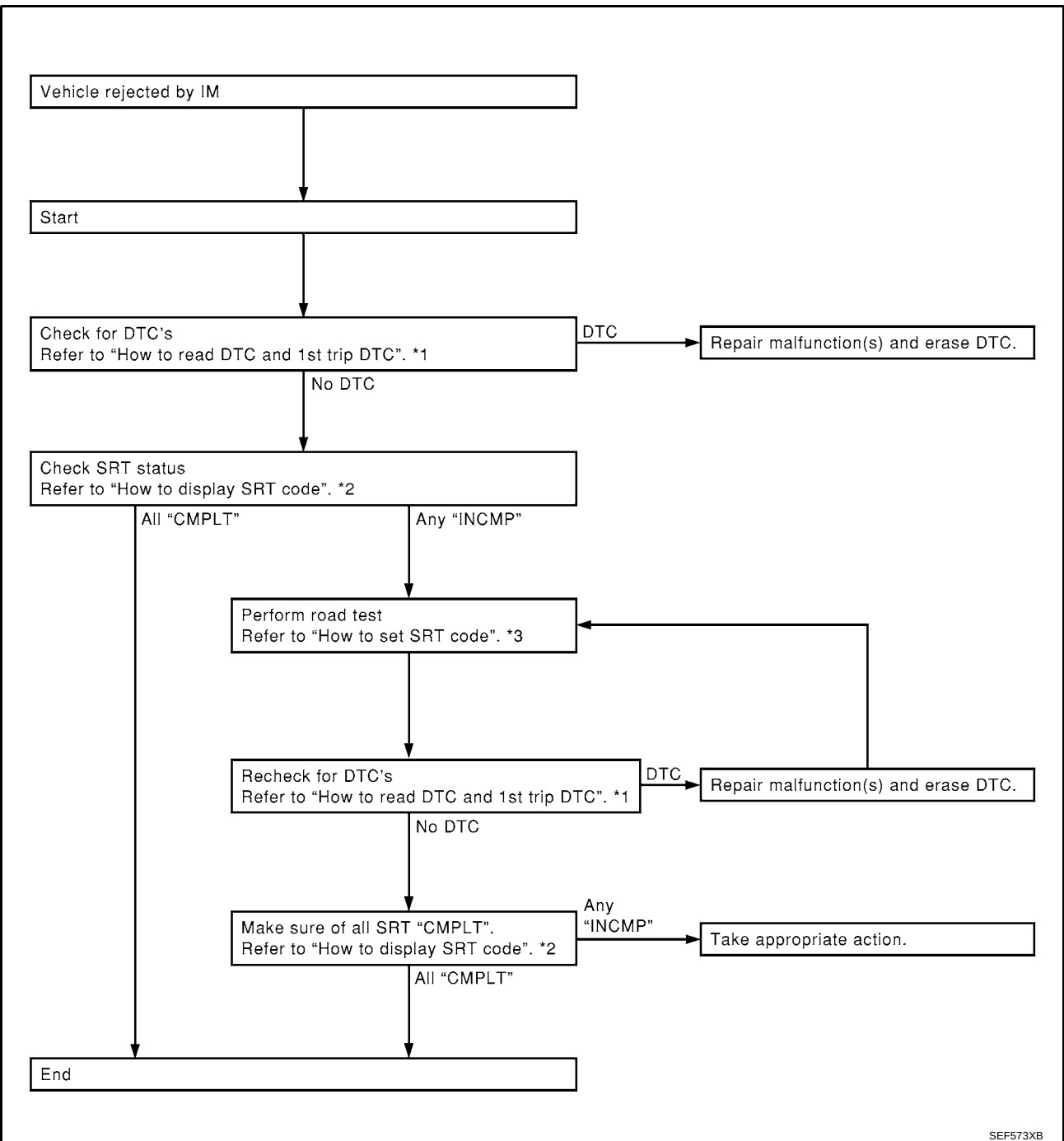
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory 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 [EC-42](#)

*2 [EC-47](#)

*3 [EC-48](#)

SEF573XB

How to Display SRT Code

WITH CONSULT-II

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

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

A sample of CONSULT-II 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 Mode 1 with GST (Generic Scan Tool)

SRT STATUS	
CATALYST	CMPLT
HO2S HTR	CMPLT
HO2S	CMPLT

PBIB0666E

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-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on [EC-45](#).

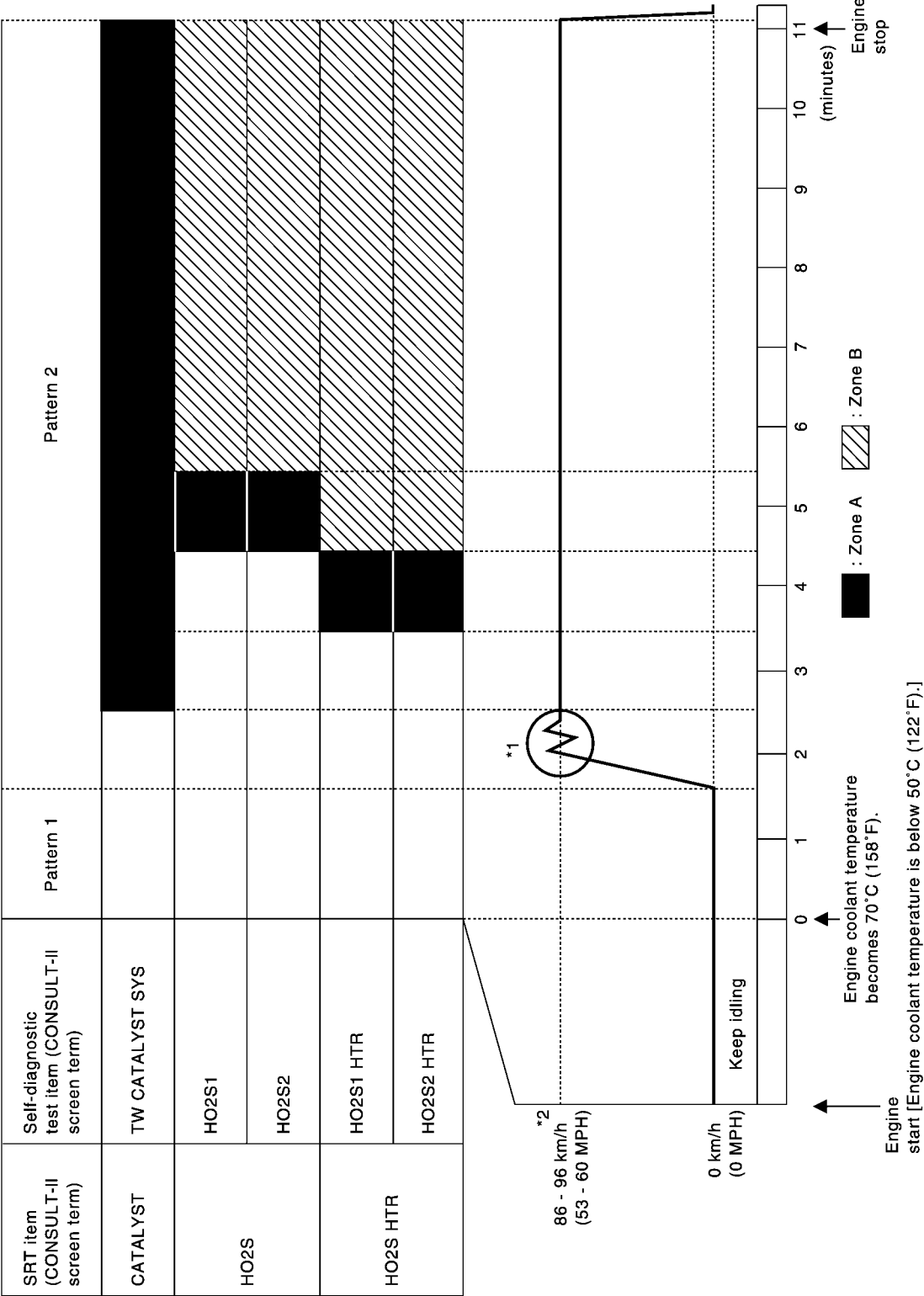
WITHOUT CONSULT-II

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.

Driving pattern



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ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
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 72 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 72 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.

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

The following is the information specified in Mode 6 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.

Items for which these data (test value and test limit) are displayed are the same as SRT code items.

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.

×: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	×
HO2S	Heated oxygen sensor 1	09H	04H	Max.	×
		0AH	84H	Min.	×
		0BH	04H	Max.	×
		0CH	04H	Max.	×
		0DH	04H	Max.	×
	Heated oxygen sensor 2	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×
HO2S HTR	Heated oxygen sensor 1 heater	29H	08H	Max.	×
		2AH	88H	Min.	×
	Heated oxygen sensor 2 heater	2DH	0AH	Max.	×
		2EH	8AH	Min.	×

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

 How to Erase DTC (With CONSULT-II)

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

NOTE:

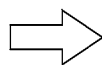
If the DTC is not for A/T related items (see [EC-10](#)), skip steps 2 through 4.

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. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF-DIAG RESULTS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)

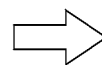
How to erase DTC (With CONSULT-II)

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.

SELECT SYSTEM
ENGINE
A/T



SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER



SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

2. Turn **CONSULT-II** “ON”, and touch “A/T”.

3. Touch “SELF-DIAG RESULTS”.

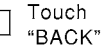
4. Touch “ERASE”. (The DTC in the TCM will be erased.)



Touch “BACK”.

Touch “BACK”.

SELECT SYSTEM
ENGINE
A/T



SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER



SELF DIAG RESULTS	
DTC RESULTS	TIME
SFT SOL A/CIRC [P0750]	0

5. Touch “ENGINE”.

6. Touch “SELF-DIAG RESULTS”.

7. Touch “ERASE”. (The DTC in the ECM will be erased.)

SEF966X

 How to Erase DTC (With GST)

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

NOTE:

If the DTC is not for A/T related items (see [EC-10](#)), skip step 2.

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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in A/T section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to Erase DTC (No Tools)

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-54, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#).
- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 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
 - Others

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.

NATS (Nissan Anti-theft System)

EBS0003D

- 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-II using NATS program card. Refer to [BL-201, "NATS\(Nissan Anti-Theft System\)"](#).
- Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.
- When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

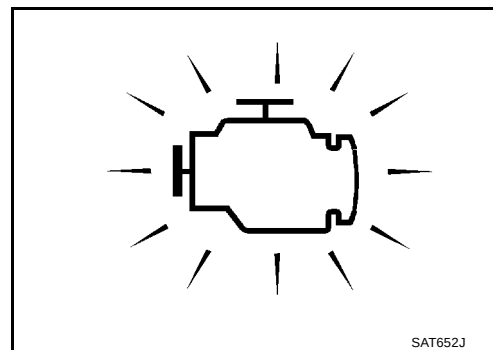
SEF515Y

Malfuction Indicator (MI) DESCRIPTION

EBS0003E

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.
- If the MI does not light up, refer to [DI-48, "WARNING LAMPS"](#) or see [EC-403](#).
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.



SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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 malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI 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.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up 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 has a malfunction and MI circuit is open by means of operating fail-safe function.

The fail-safe function also operate when above diagnoses except MI circuit and demands the driver to repair the a malfunction.

Engine operating condition in fail-safe mode

Engine speed will not rise more than 2,500 rpm due to the fuel cut

MI Flashing without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. [EC-54, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#) .

How to switch the diagnostic test (function) modes, and details of the above functions are described later, [EC-54, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#) .

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
- Others

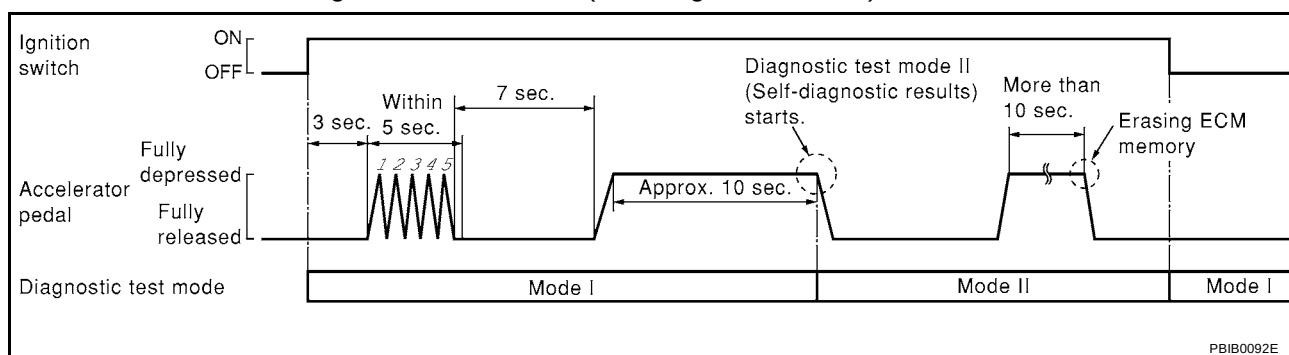
HOW TO SWITCH DIAGNOSTIC TEST MODE

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 MI starts blinking.
4. Fully release the accelerator pedal.
ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to [EC-54, "How to Set Diagnostic Test Mode II \(Self-diagnostic Results\)"](#).
2. Start Engine.
ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to [EC-54, "How to Erase 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 MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [DI-48, "WARNING LAMPS"](#) or see [EC-403](#).

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

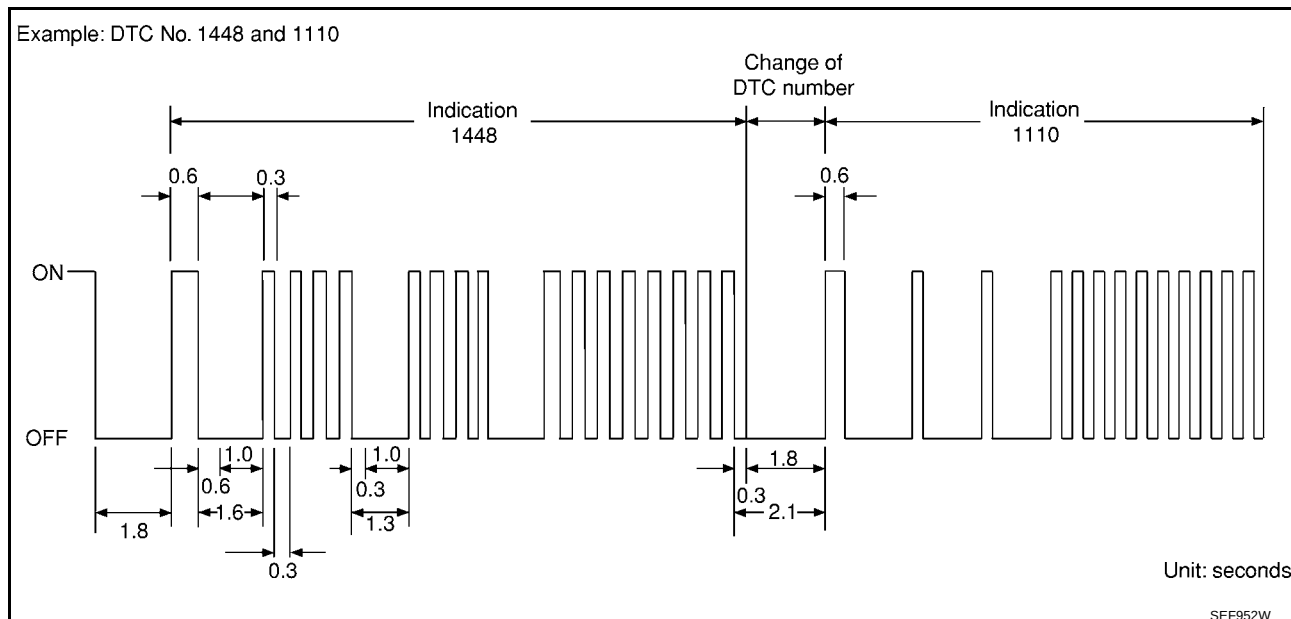
DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st 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 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

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

codes can be identified by using the CONSULT-II 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.

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-10, "INDEX FOR DTC"](#))

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 [EC-54, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#) .

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

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air-fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

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

EBS0003F

- 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 MI will come on. For details, refer to [EC-39, "Two Trip Detection Logic"](#) .

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

- The MI 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-II 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
MI (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)

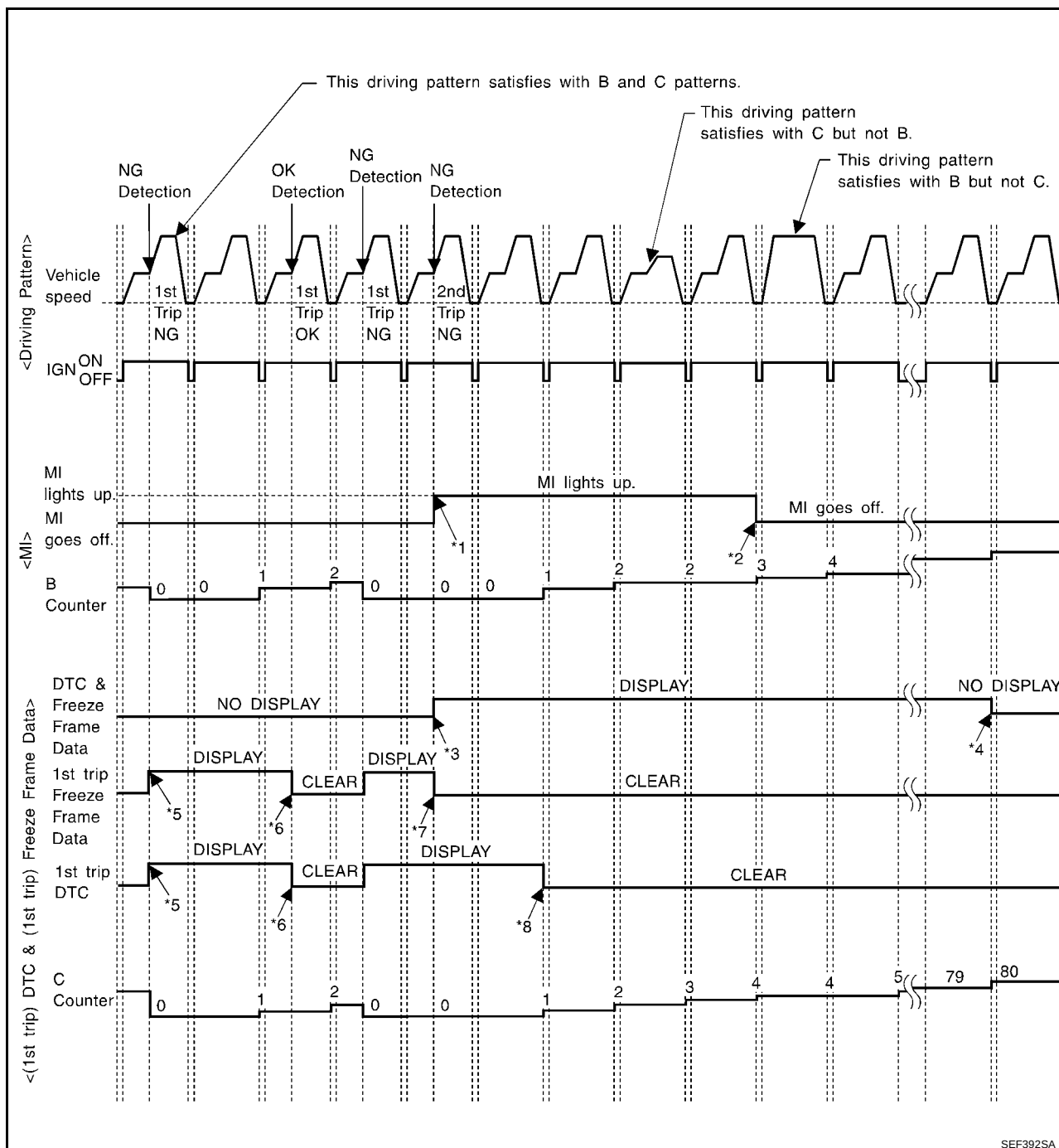
For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see [EC-58](#).

For details about patterns "A" and "B" under "Other", see [EC-60](#).

*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 MI, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE” <EXHAUST QUALITY DETERIORATION>, “FUEL INJECTION SYSTEM”



*1: When the same malfunction is detected in two consecutive trips, MI will light up.	*2: MI 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:

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 MI 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:

1. 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:

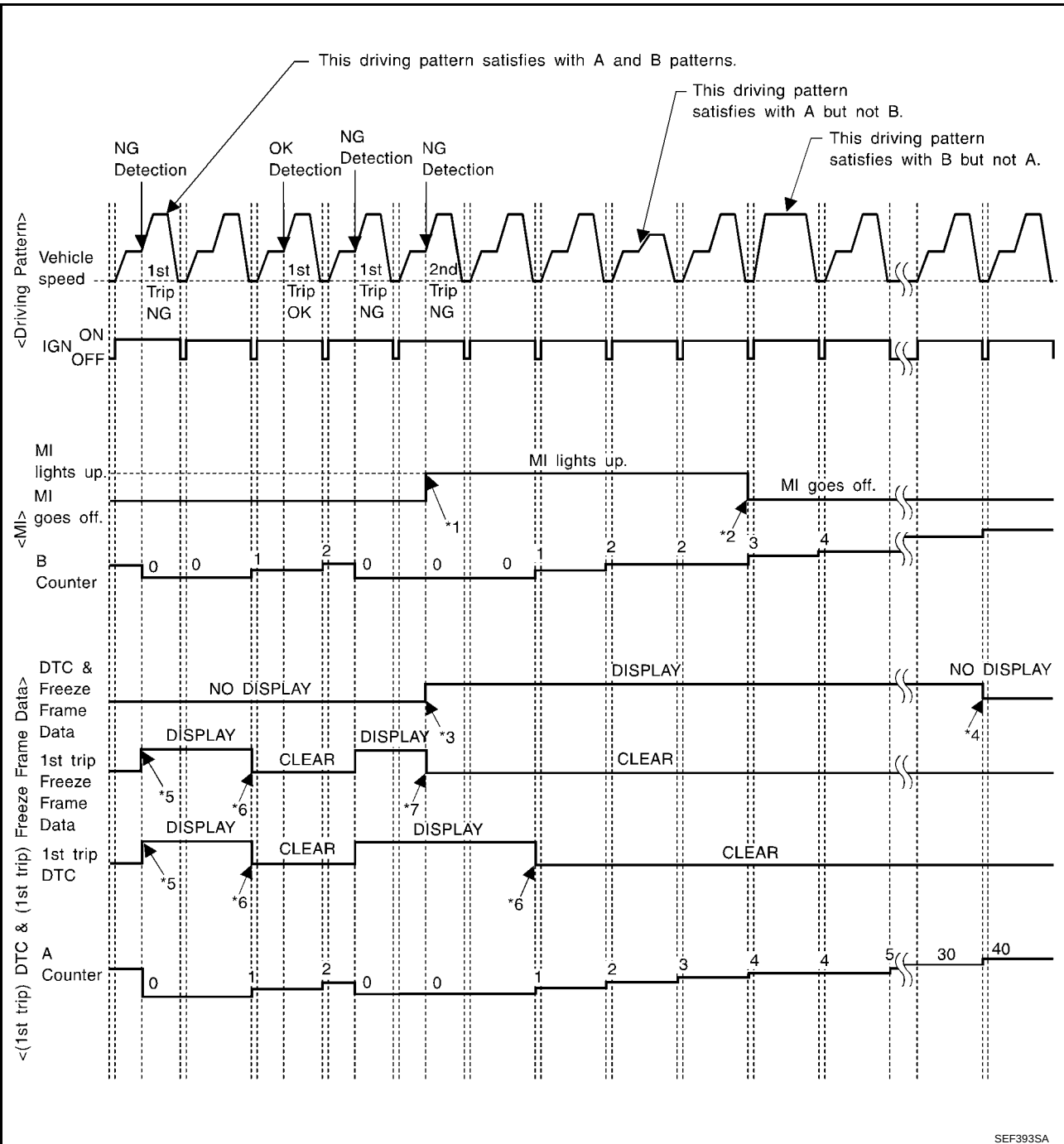
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- 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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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



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

*2: MI 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.

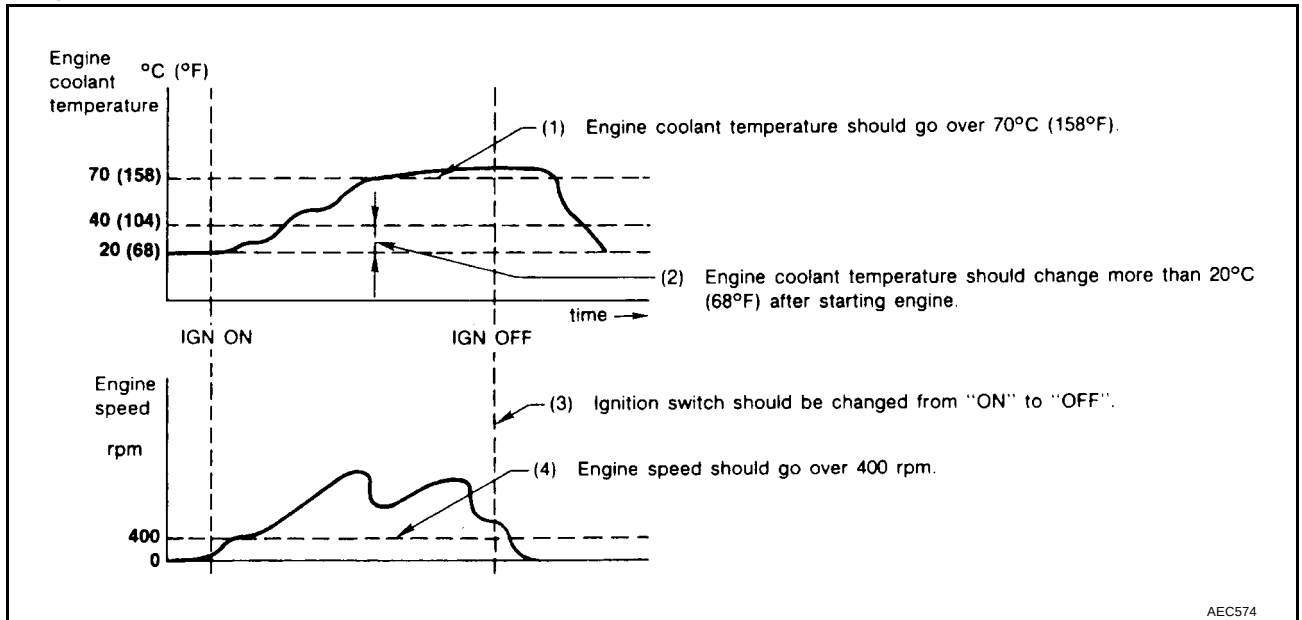
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITH EURO-OBD)]

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

<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 MI will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

TROUBLE DIAGNOSIS

PFP:00004

EBS0003G

Trouble Diagnosis Introduction

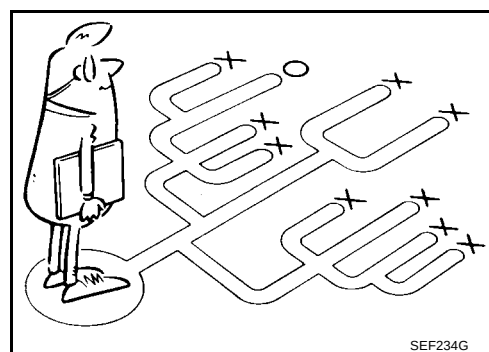
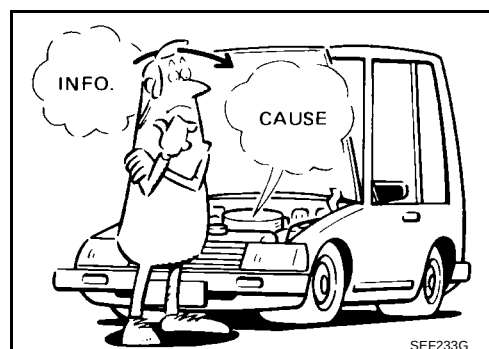
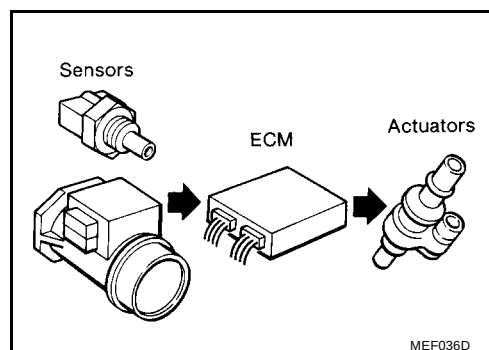
INTRODUCTION

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 a 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-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on [EC-62](#).

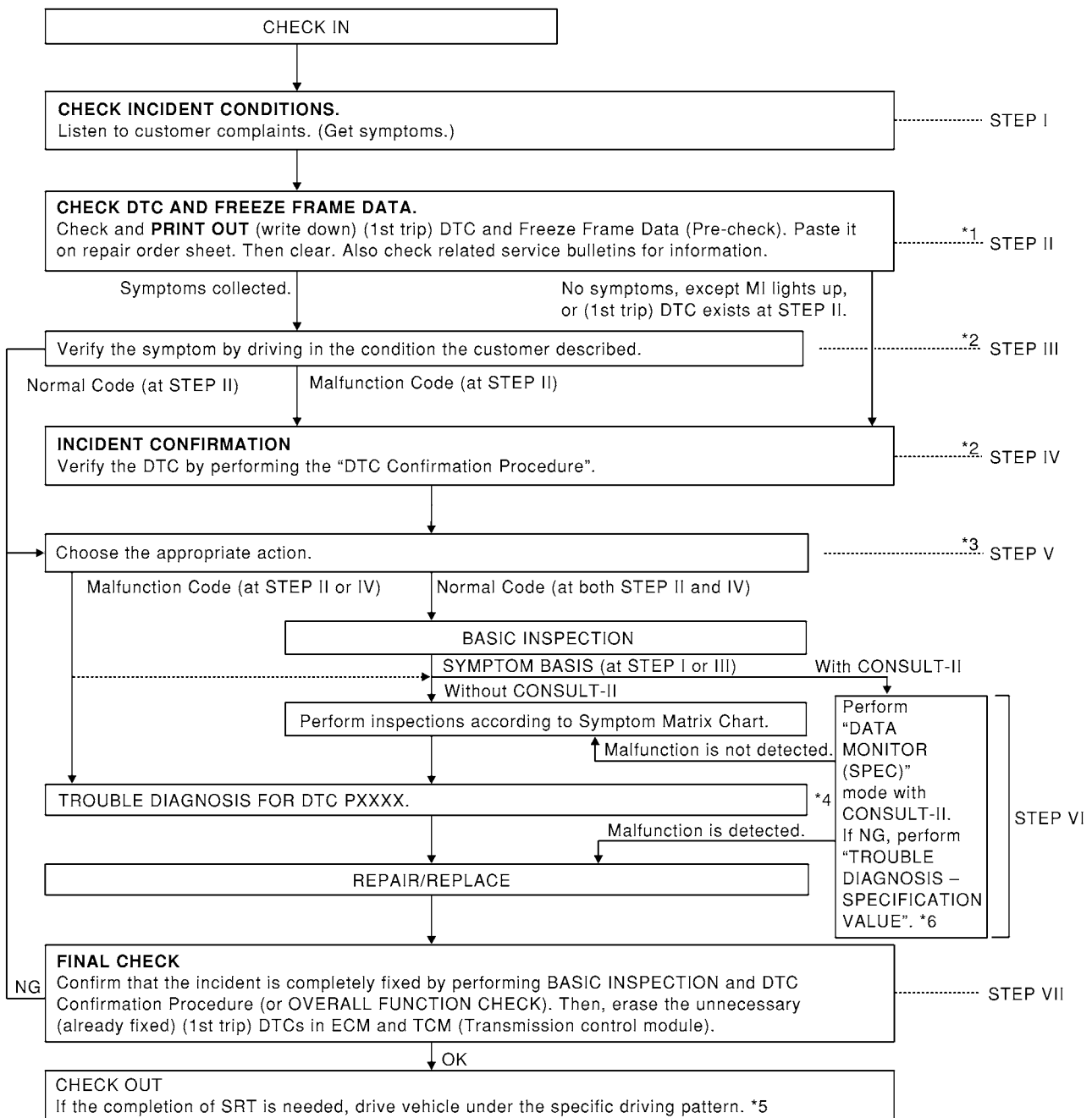
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on [EC-65](#) 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

Flow Chart



MBIB0159E

*1 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*2 If the incident cannot be verified, perform [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to [EC-115, "POWER SUPPLY CIRCUIT FOR ECM"](#).

*4 If malfunctioning part cannot be detected, perform [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*5 [EC-49](#)

*6 [EC-109](#)

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

Description for Work Flow

STEP	DESCRIPTION	
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-64 .	A
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-51 .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-72 .) Also check related service bulletins for information.	EC C
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.	D E
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.	F G
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-68 .) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS – SPECIFICATION VALUE". (Refer to EC-109 .) (If malfunction is detected, proceed to "PERAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-72 .)	H I
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-84 , EC-104 . The "Diagnostic Procedure" in EC section contains a description 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-24, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .	J K L
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-37, "HOW TO ERASE DTC" .)	M

DIAGNOSTIC WORKSHEET**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 or blink 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

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBDD)]

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0107 P0108 Manifold absolute pressure sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P0705 Park/Neutral position (PNP) switch ● P1171 Intake error ● P1229 Sensor power supply ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch
2	● P0031 P0032 Heated oxygen sensor 1 heater ● P0037 P0038 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0444 EVAP canister purge volume control solenoid valve ● P0710 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0745 P0750 P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 Throttle control motor relay ● P1128 Throttle control mother ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

Fail-safe Chart

EBS0003I

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

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0107 P0108	Manifold absolute pressure sensor circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut.
P0112 P0113	Intake air temperature sensor circuit	Intake air temperature is determined as 30° (86°F).

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

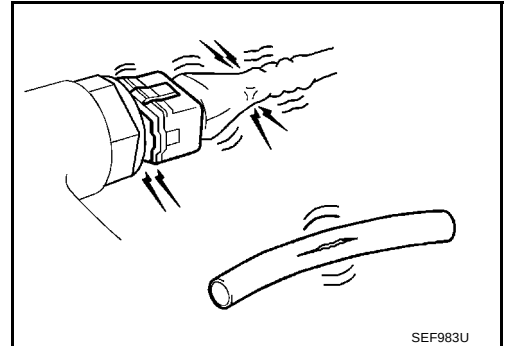
DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II 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.	
P0221 P0222 P0223 P1223 P1224	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.	
P0226 P0227 P0228 P1227 P1228	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.	
P1121	Electric throttle control actuator (ECM detect 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, 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.	
P1171	Intake air	When accelerator pedal is depressed, engine speed will not rise more than 2,500 rpm due to fuel cut.	
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.	

- When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up when there is a malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses is continuously detected as NG for 5 trips, ECM warns the driver that engine control system has a malfunction and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operate when above diagnoses except MI circuit and demands the driver to repair the malfunction.

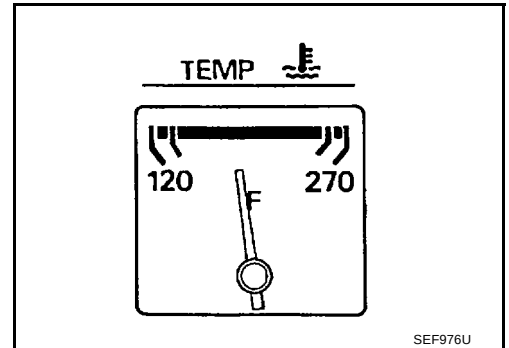
Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Basic Inspection**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.



SEF983U

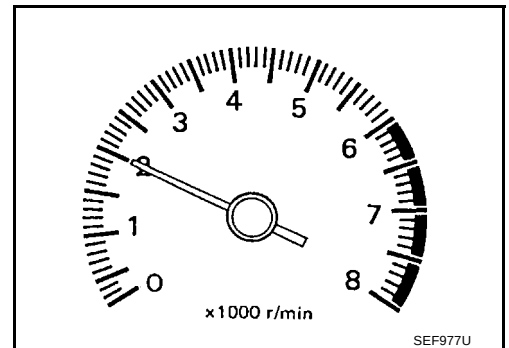


SEF976U

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-II or GST.

OK or NG

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



SEF977U

2. REPAIR OR REPLACE

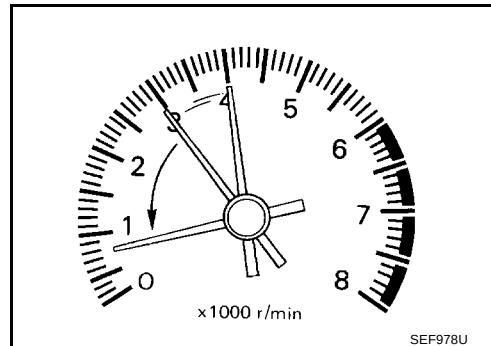
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".

>> GO TO 3

3. CHECK TARGET IDLE SPEED

With CONSULT-II

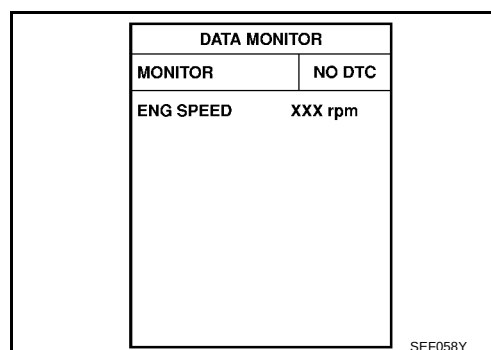
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. 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.
3. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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

1. Stop engine.
2. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-34, "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-34, "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-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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-247](#) .
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-241](#) .

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 the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to [EC-52](#) .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 5 ± 5° BTDC

A/T: 5 ± 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-34, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-34, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-34, "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-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)

 **Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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.

M/T: 5 ± 5° BTDC

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

OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 16.

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16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-46, "TIMING CHAIN"](#).

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-247](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-241](#).

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 the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to [EC-52](#).

>> GO TO 4.

Symptom Matrix Chart SYSTEM — BASIC ENGINE CONTROL SYSTEM

EBS0003K

		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-391
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-37
	Injector circuit	1	1	2	3	2		2	2			2			EC-385
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-405

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

		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	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-409
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-68
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-276 , EC-278 , EC-284 , EC-289
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-68
	Ignition circuit	1	1	2	2	2		2	2			2			EC-376
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-115
Manifold absolute pressure sensor circuit		1	1	2	2	2		2	2			2			EC-136
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-146
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-201 , EC-207 , EC-341 , EC-347 , EC-349 , EC-360
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-213 , EC-222 , EC-351
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-151 , EC-157 , EC-167 , EC-294 , EC-300
Knock sensor circuit				2	2							3			EC-237
Crankshaft position sensor (POS) circuit		2	2												EC-241
Camshaft position sensor (PHASE) circuit		2	2												EC-247
Vehicle speed signal circuit			2	3		3						3			EC-263
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-265 , EC-268
Intake valve timing control solenoid valve circuit		3	3	2		1	3	2	2	3		3			EC-272
PNP switch circuit				3		3	3	3	3	3		3			EC-364
Refrigerant pressure sensor circuit			2				3	3	3	3		4			EC-396
Electrical load signal circuit							3	3	3	3					EC-401

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

	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	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-11 , MTC-17
ABS actuator and electric unit (control unit)			4											BRC-6

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		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 tank	5	5												FL-8	
	Fuel piping			5	5	5		5	5			5		FL-3 , EM-28		
	Vapor lock														—	
	Valve deposit														—	
	Poor fuel (Heavy weight gaso-line, Low octane)	5		5	5	5		5	5			5			—	

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

		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		
Air	Air duct		5	5	5	5	5	5	5	5	5	5			EM-14	
	Air cleaner															5
	Air leakage from air duct (Manifold absolute pressure sensor —electric throttle control actuator)															
	Electric throttle control actuator															
	Air leakage from intake manifold/Collector/Gasket	EM-18														
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4	
	Alternator circuit														SC-14	
	Starter circuit	3												SC-27		
	Signal plate/Flywheel/Drive plate	6												EM-69		
	PNP switch	4												MT-8 or AT-111		
Engine	Cylinder head	5	5	5	5	5		5	5			5	3		EM-57	
	Cylinder head gasket										4					
	Cylinder block	6	6	6	6	6		6	6		6	6	4			EM-69
	Piston															
	Piston ring															
	Connecting rod															
	Bearing															
	Crankshaft															
Valve mechanism	Timing chain	5	5	5	5	5	5	5	5	5	5	3		EM-46		
	Camshaft													EM-34		
	Intake valve timing control													EM-46		
	Intake valve													EM-57		
	Exhaust valve															
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-20, EX-3	
	Three way catalyst															

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TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

		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
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2	EM-22 , LU-6 , LU-7 , LU-3
	Oil level (Low)/Filthy oil													LU-4
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5	5	5	5	2	5			CO-10
	Thermostat													CO-22
	Water pump													CO-20
	Water gallery													CO-6
	Cooling fan													CO-10
	Coolant level (low)/Contaminated coolant													CO-7
NATS (Nissan Anti-theft System)		1	1											EC-52 or BL-201

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

Engine Control Component Parts Location

EBS0003L

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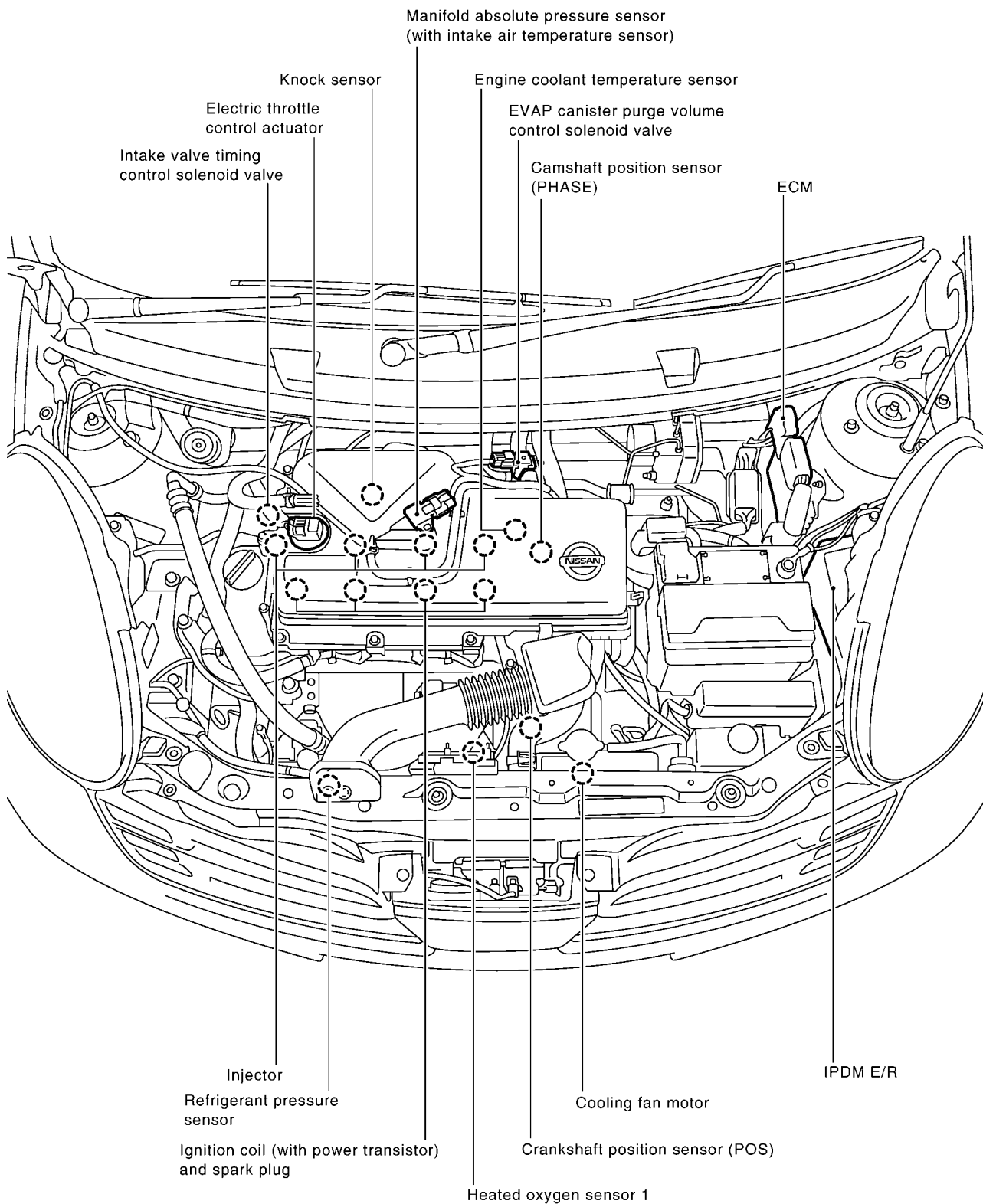
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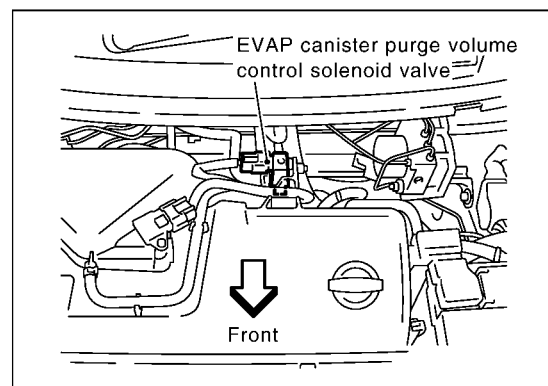
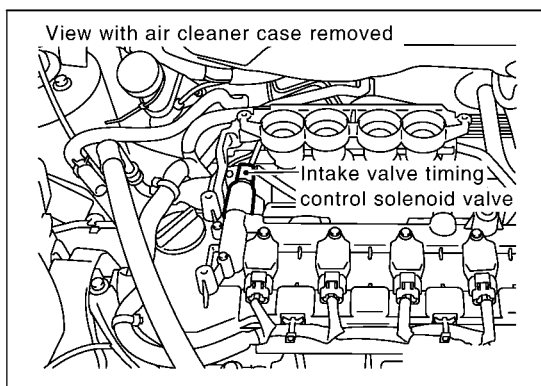
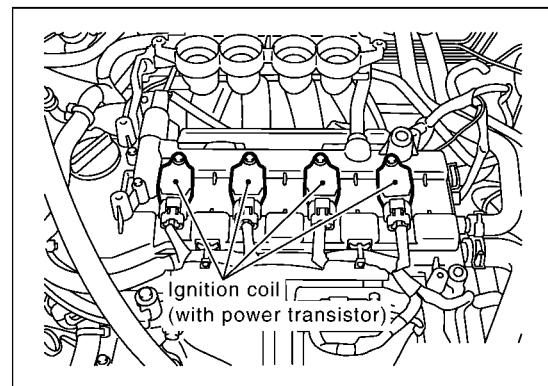
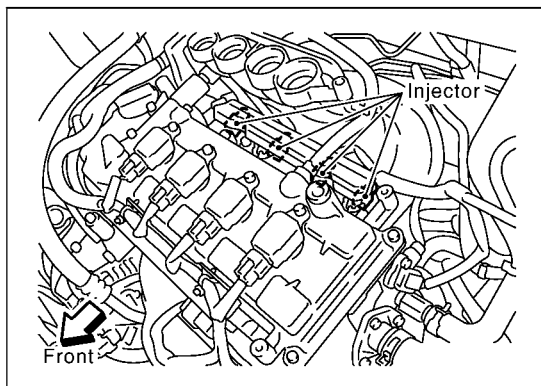
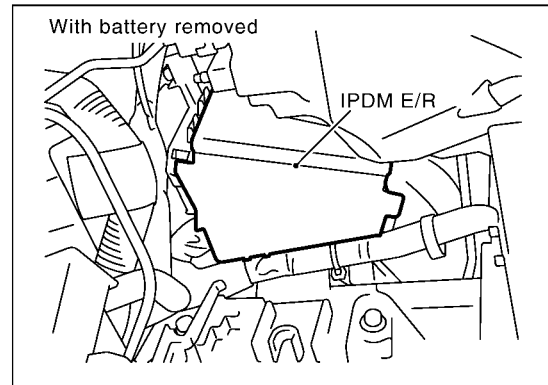
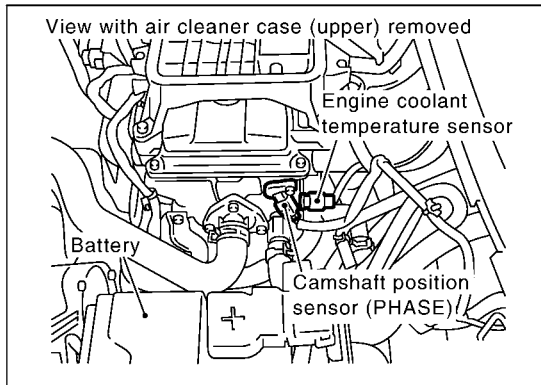
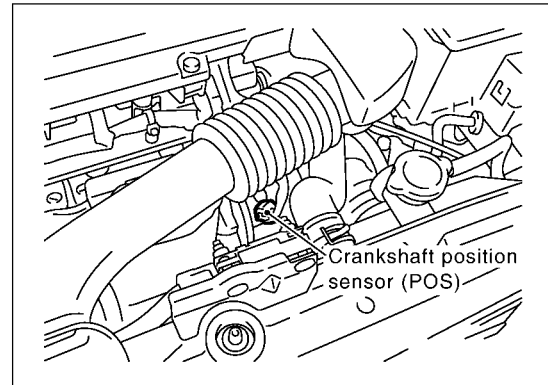
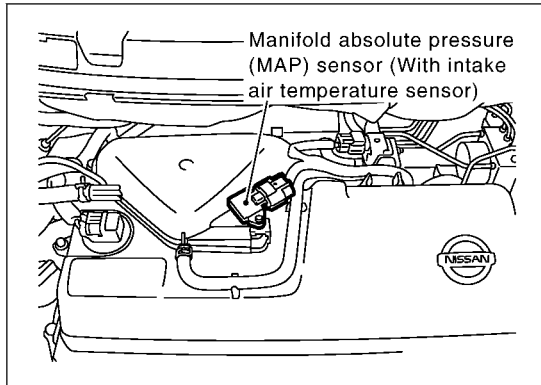
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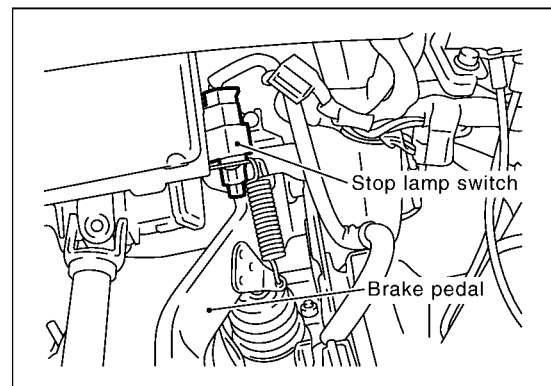
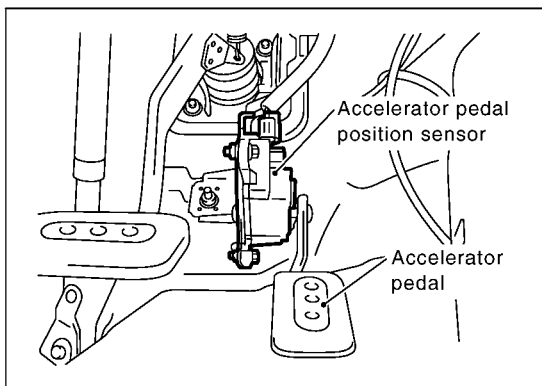
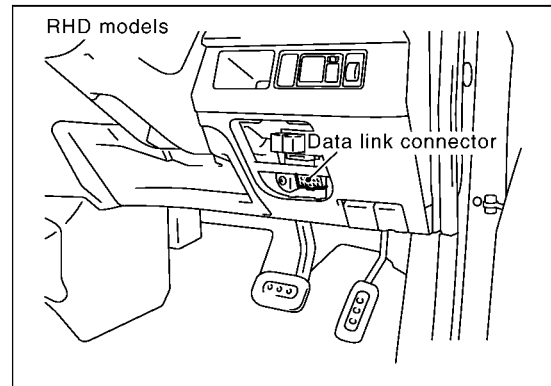
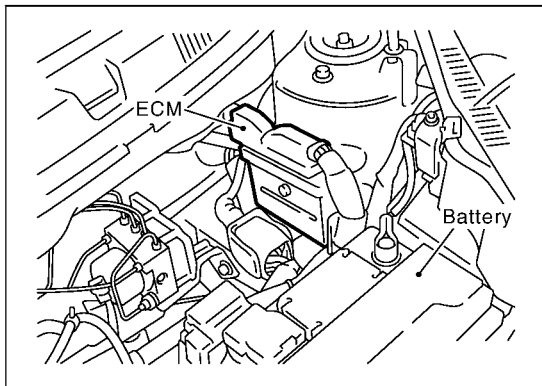
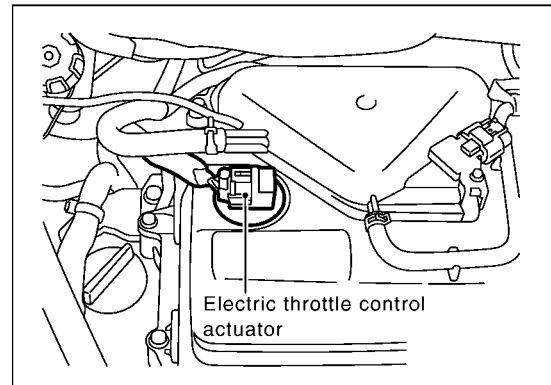
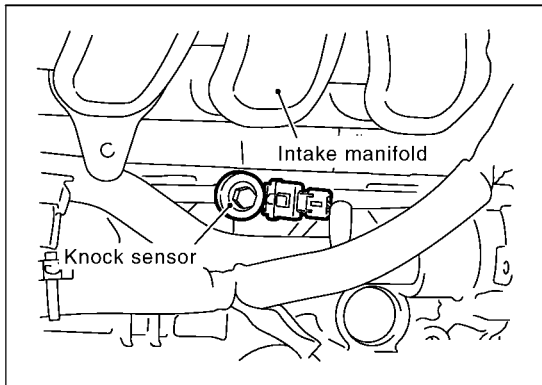
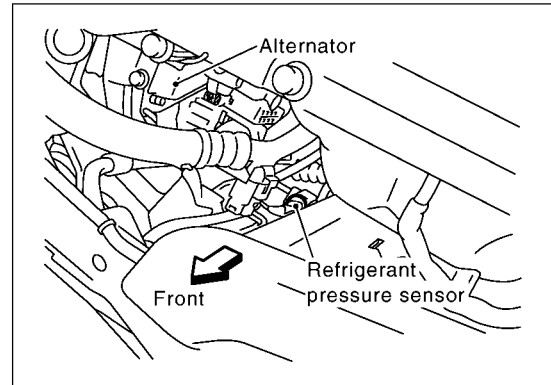
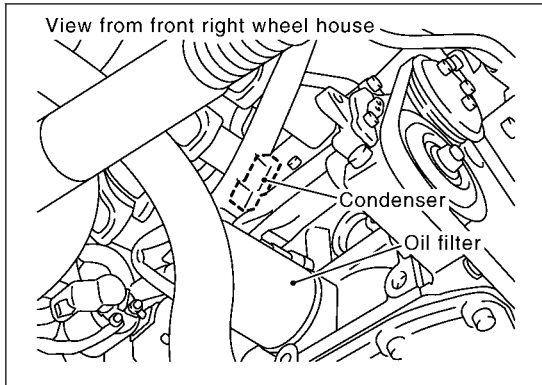
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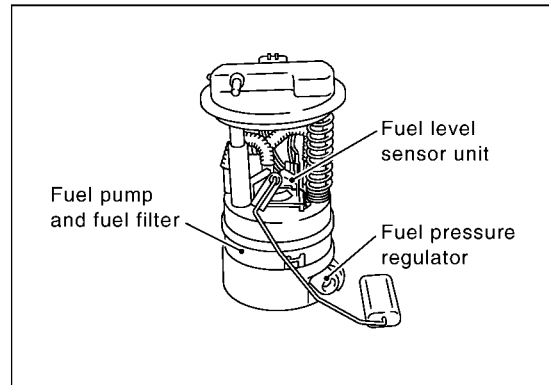
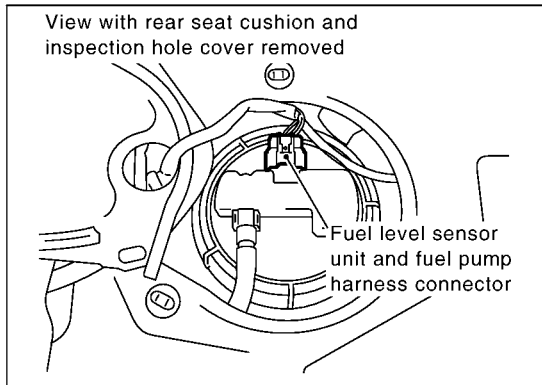
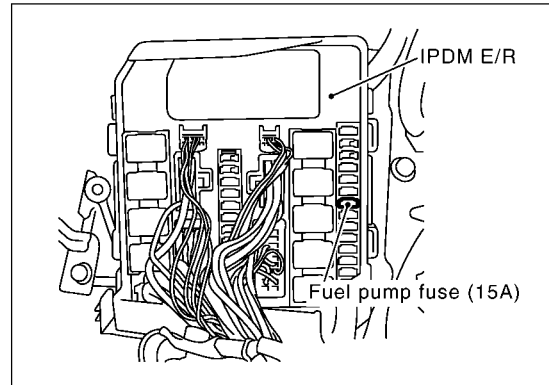
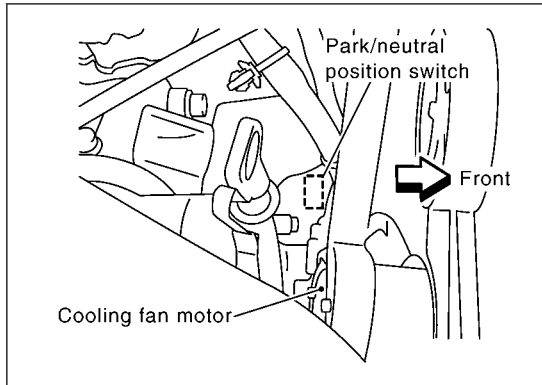


MBIB0267E





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EC

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D

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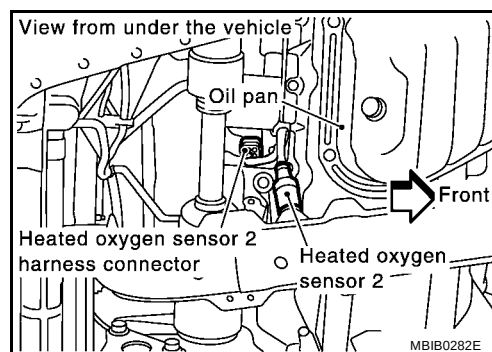
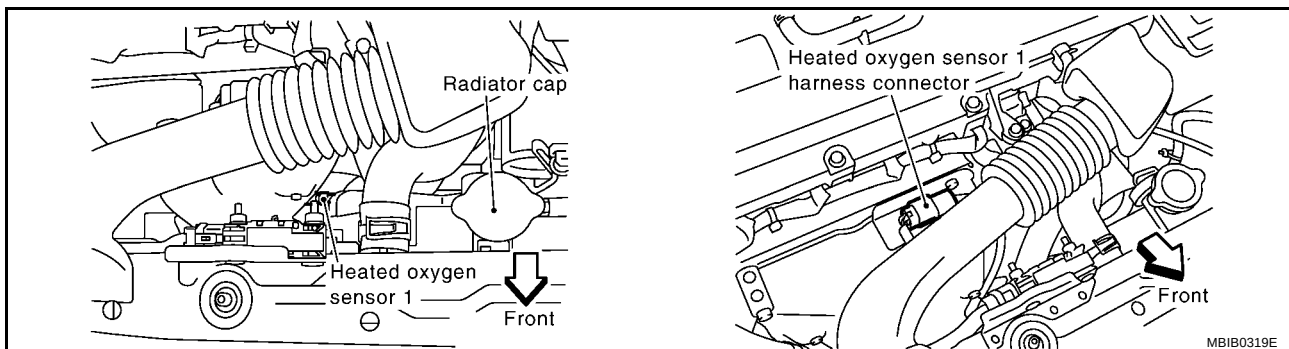
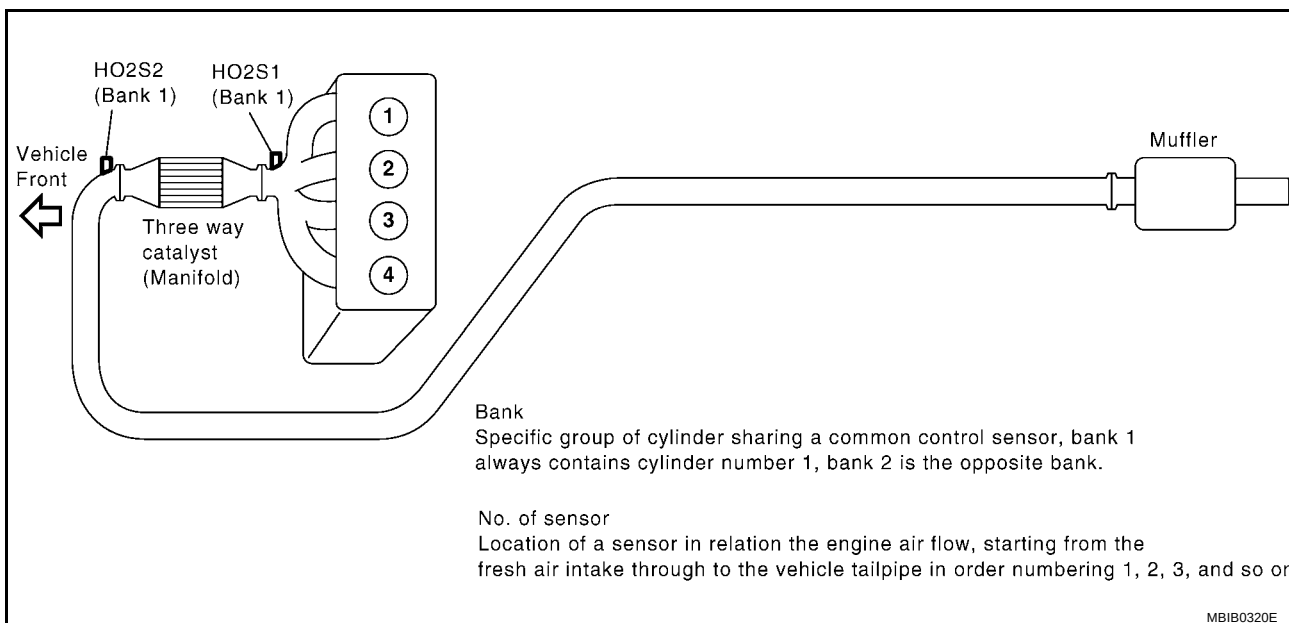
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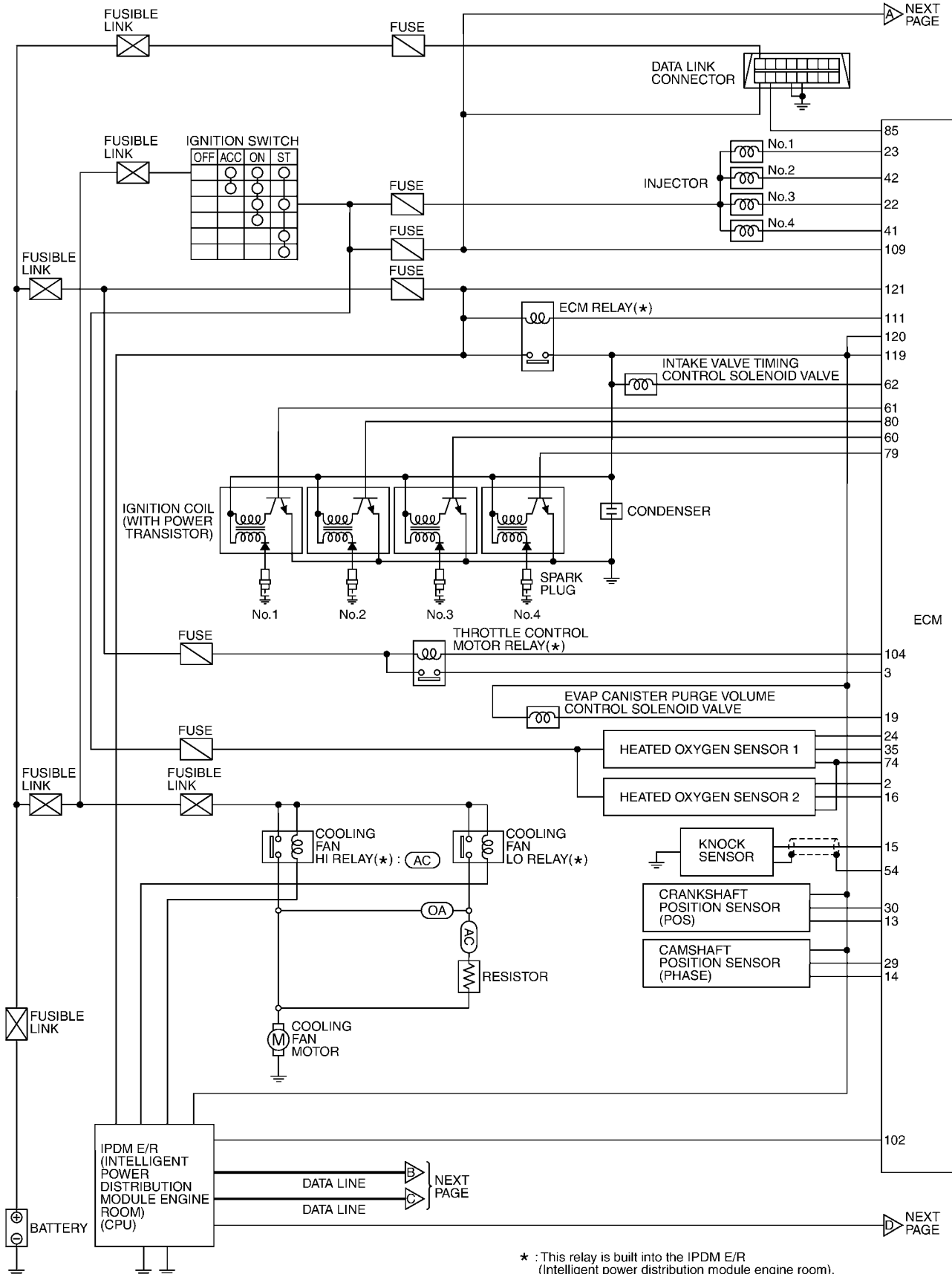
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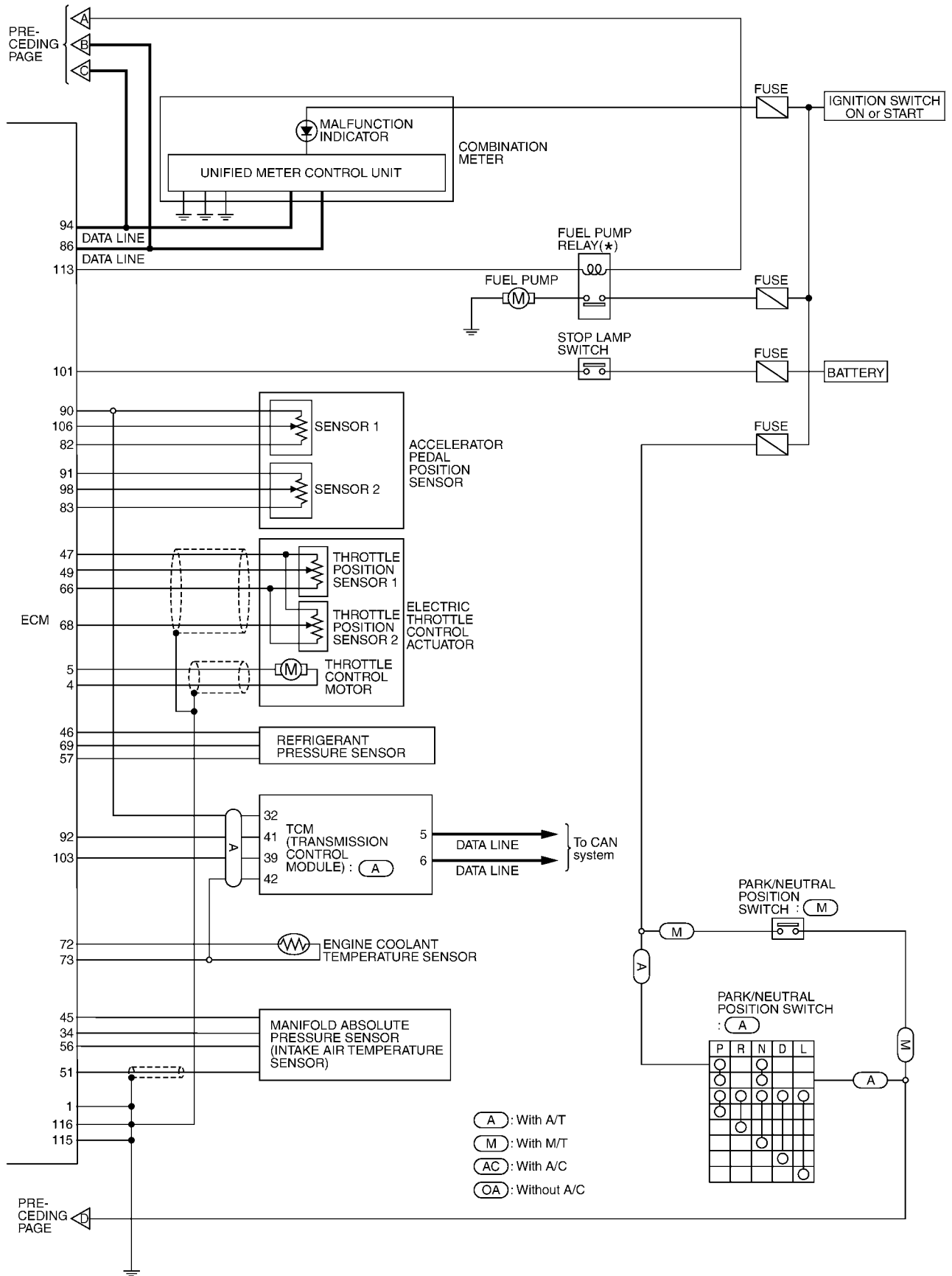
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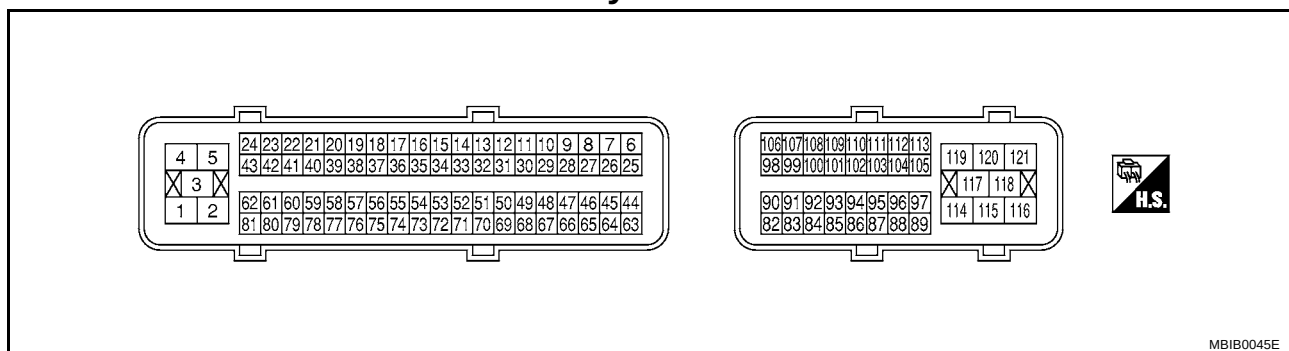
Circuit Diagram





ECM Harness Connector Terminal Layout

EBS0003N

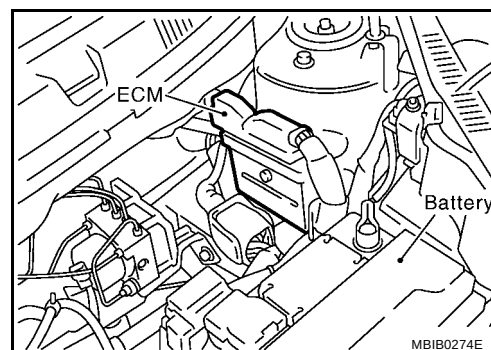


MBIB0045E

ECM Terminals and Reference Value
PREPARATION

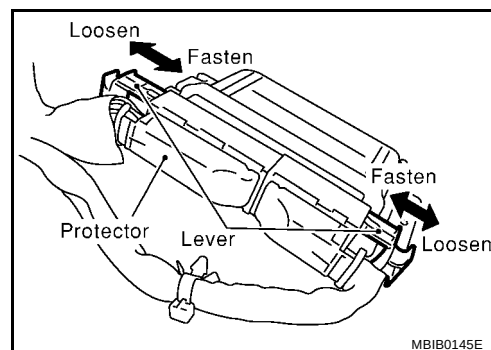
EBS0003O

1. ECM is located left hand side of the engine room.
2. Remove ECM harness protector.



MBIB0274E

3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
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.



MBIB0145E

ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

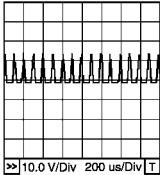
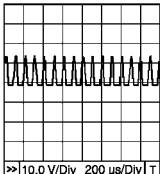
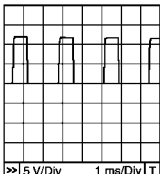
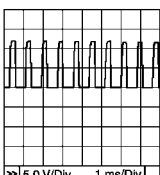
CAUTION:

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] ● Idle speed	Engine ground

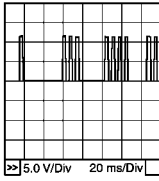
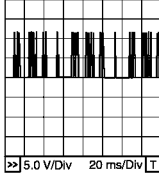
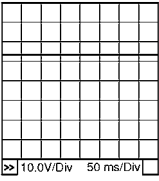
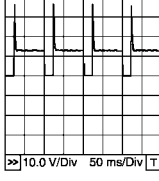
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
2	GY	Heated oxygen sensor 2 heater	[Engine is running] - Engine speed is below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - 1.0V	A
			[Ignition switch "ON"] - Engine stopped [Engine is running] - Engine speed is above 3,800 rpm	BATTERY VOLTAGE (11 - 14V)	EC
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)	C
4	L	Throttle control motor (Close)	[Ignition switch "ON"] Engine stopped - Shift lever position is "D" (A/T model) - Shift lever position is "1st" (M/T model) - Accelerator pedal is releasing	0 - 14V★  PBIB0534E	D
5	P	Throttle control motor (Open)	[Ignition switch "ON"] Engine stopped - Shift lever position is "D" (A/T model) - Shift lever position is "1st" (M/T model) - Accelerator pedal is depressing	0 - 14V★  PBIB0533E	E
13	Y	Crankshaft position sensor (POS)	[Engine is running] Warm-up condition - Idle speed	Approximately 3.0V★  PBIB0527E	F
			[Engine is running] Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E	G

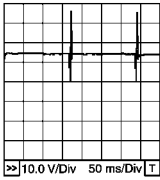
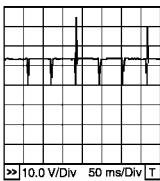
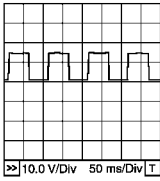
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	[Engine is running] ● Warm-up condition ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Engine speed is Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	LG	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

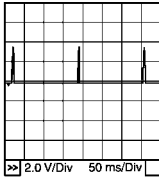
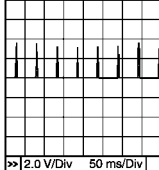
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	OR L R GY	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	Y	Heated oxygen sensor 1 heater	[Engine is running] ● Warm-up condition ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
29	B	Sensors' ground (Camshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
30	B	Sensors' ground (Crankshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
34	OR	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	L	Sensor's power supply	[Ignition switch "ON"]	Approximately 5V
46	W	Sensor's power supply (Refrigerant pressure sensor)	[Ignition switch "ON"]	Approximately 5V
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V

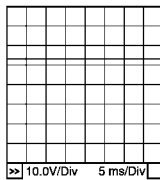
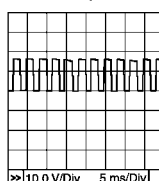
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V
54	—	Sensors' ground (Knock sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
56	B	Sensors' ground (Manifold absolute pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
57	Y	Sensors' ground (Refrigerant pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
60 61 79 80	Y PU G BR	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] ● Warm-up condition ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

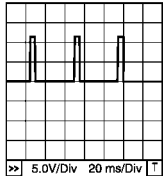
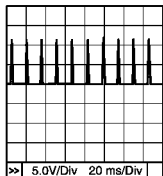
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	LG	Intake valve timing control solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● Warm-up condition ● When revving engine up to 2,000 rpm quickly	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB00532E
66	B	Sensors' ground (Throttle position sen- sor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V
69	BR	Refrigerant pressure sensor	[Engine is running] ● Warm-up condition ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	P	Engine coolant tempera- ture sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensors' ground (Engine coolant temper- ature sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	LG	DATA link connector	[Ignition switch "ON"] ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	W	CAN communication line	[Ignition switch "ON"]	1.0 - 2.5V
90	OR	Sensor's power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensor's power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
92	GY	Throttle position sensor signal output (A/T models)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Accelerator pedal fully released	Approximately 0.5V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Accelerator pedal fully depressed	Approximately 4.2V
94	R	CAN communication line	[Ignition switch "ON"]	2.5 - 4.0V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
101	W	Stop lamp switch	[Ignition switch "ON"] ● Brake pedal fully released	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
102	GY	PNP switch	[Ignition switch "ON"] ● Gear position is "P" or "N" (A/T models), "Neutral" (M/T models)	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
103	L/OR	Tachometer signal output (A/T models)	[Engine is running] ● Warm-up condition ● Idle speed	10 - 11V★  MBIB0053E
			[Engine is running] ● Engine speed is 2,000 rpm	10 - 11V★  MBIB0054E

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
104	G	Throttle control motor relay	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)	EC
			[Ignition switch "ON"]	0 - 1.0V	
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V	C
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V	
109	PU	Ignition switch	[Ignition switch "OFF"]	0V	E
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)	
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V	F
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)	
113	R	Fuel pump relay	[Ignition switch "ON"] ● For 1 seconds after turning ignition switch "ON"	0 - 1.0V	I
			[Engine is running] [Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)	
115 116	B B	ECM ground	[Engine is running] ● Idle speed	Engine ground	K
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)	L
121	BR	Power supply for ECM (Back-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)	M

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

CONSULT-II Function FUNCTION

EBS0003P

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-II 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, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II 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.

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

*: 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
- Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item		DIAGNOSTIC TEST MODE							
		WORK SUP- PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI- TOR	DATA MONI- TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP- PORT
ENGINE CONTROL COMPONENT PARTS INPUT	Crankshaft position sensor (POS)		×	×	×	×			
	Camshaft position sensor (PHASE)		×		×	×			
	Manifold absolute pressure sensor		×		×	×			
	Engine coolant temperature sensor		×	×	×	×	×		
	Heated oxygen sensor 1		×		×	×		×	×
	Heated oxygen sensor 2		×		×	×		×	×
	Vehicle speed signal		×	×	×	×			
	Accelerator pedal position sensor		×		×	×			
	Throttle position sensor		×		×	×			
	Intake air temperature sensor		×		×	×			
	Knock sensor		×						
	Refrigerant pressure sensor				×	×			
	Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
	Air conditioner switch				×	×			
	Park/neutral position (PNP) switch		×		×	×			
	Stop lamp switch		×		×	×			
	Battery voltage				×	×			
	Electrical load signal				×	×			

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

Item		DIAGNOSTIC TEST MODE							
		WORK SUP- PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI- TOR	DATA MONI- TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP- PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors			×	×	×		
		Power transistor (Ignition timing)			×	×	×		
		Throttle control motor relay	×		×	×			
		Throttle control motor	×						
		EVAP canister purge volume control solenoid valve	×		×	×	×		
		Air conditioner relay			×	×			
		Fuel pump relay	×		×	×	×		
		Cooling fan relay	×		×	×	×		
		Heated oxygen sensor 1 heater	×		×	×		×	
		Heated oxygen sensor 2 heater	×		×	×		×	
		Intake valve timing control solenoid valve	×		×	×	×		
		Calculated load value		×	×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

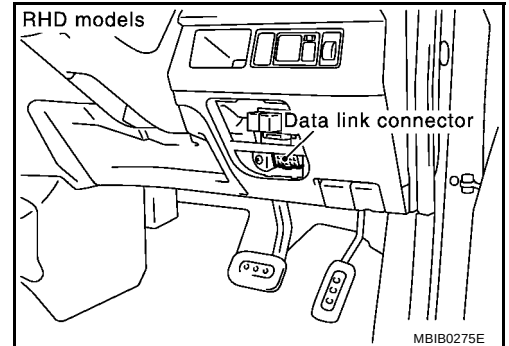
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to [EC-43](#).

CONSULT-II INSPECTION PROCEDURE

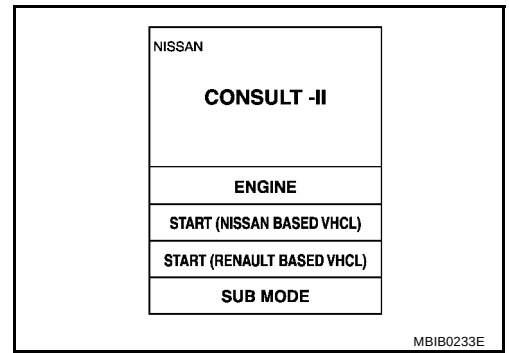
CAUTION:

If CONSULT-II is used with no connection to CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

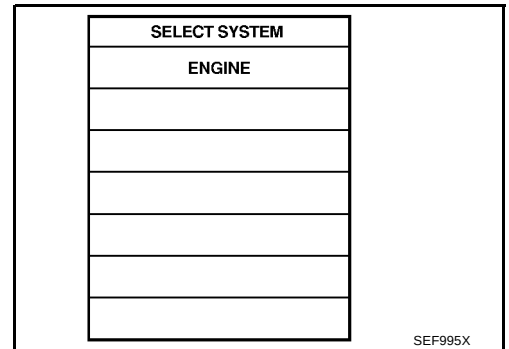
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" and "CONSULT-II CONVERTER" to data link connector, which is located under drivers side dash panel.
3. Turn ignition switch ON.



4. Touch "START(NISSAN BASED VHCL)".

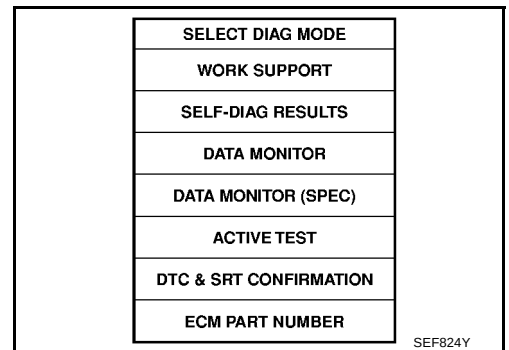


5. Touch "ENGINE".
If "ENGINE" is not indicated, go to [GI-36](#) "CONSULT-II Data Link Connector (DLC) Circuit".



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



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 IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed

*: 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-10, "INDEX FOR DTC"](#).

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-10, "INDEX FOR DTC".)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed. - One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
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 TRIM-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.
S-FUEL TRIM-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.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VHCL 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.

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
ENG SPEED [rpm]	×	×		Indicates the engine speed computed from the signals 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.
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.
HO2S1 (B1) [V]	×	×		The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×			The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×	×		Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	- After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. - When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
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.
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.
VHCL SPEED SE [km/h] or [mph]	×	×		The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×		The power supply voltage of ECM is displayed.	
B/FUEL SCHDL [msec]		×		"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
ACCEL SEN 1 [V]	×	×		The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×				
THRTL SEN 1 [V]	×	×		The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×				

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
INT/A TEMP SE [°C] or [°F]	×	×		The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
TURBO BST SEN	×			The signal voltage of the manifold absolute pressure sensor is displayed.	
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 the 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) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×		[ON/OFF] condition of the power steering oil pressure switch as determined by the power steering oil pressure 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.	
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.
IGN TIMING [BTDC]		×		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 airflow divided by peak airflow.	
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.	

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TROUBLE DIAGNOSIS

[CR (WITH EURO-OBDD)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
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. - ON ... intake valve timing control is operating. - OFF ... Intake valve timing control 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]				- Indicates the condition of the cooling fan (determined by ECM according to the input signals). - HI ... High speed operation - LOW ... Low speed operation - OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]				Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]				Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
VEHICLE SPEED [km/h] or [mph]	×			Indicates the vehicle speed computed from the secondary speed sensor 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 MI is activated.	
O2 SEN HTR DTY [%]				Indicates the heated oxygen sensor 1 heater control valve computed by the ECM according to the input signals.	
AC PRESS SEN [V]	×			The signal voltage from the refrigerant pressure sensor is displayed.	
CRUISE LAMP [ON/OFF]				Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	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					
CAN COMM [OK/NG]			×	Indicates the communication condition of CAN communication line.	These items are not displayed in “SELECTION FROM MENU” mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		
CAN CIRC 8 [OK/UNKWN]			×		
CAN CIRC 9 [OK/UNKWN]			×		

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 signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×		Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
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 [%]		×	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.

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	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 "N" ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN*1	● Ignition switch: ON ● Turn the cooling fan "ON" and "OFF" with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
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-II.	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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to [EC-43, "SYSTEM READINESS TEST \(SRT\) CODE"](#).

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

Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-157
	HO2S1 (B1) P0134		EC-167
	HO2S1 (B1) P1143		EC-294
	HO2S1 (B1) P1144		EC-300
HO2S2	HO2S2 (B1) P0139		EC-180
	HO2S2 (B1) P1146		EC-306
	HO2S2 (B1) P1147		EC-314

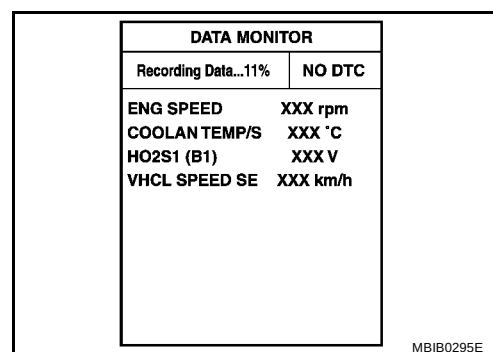
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

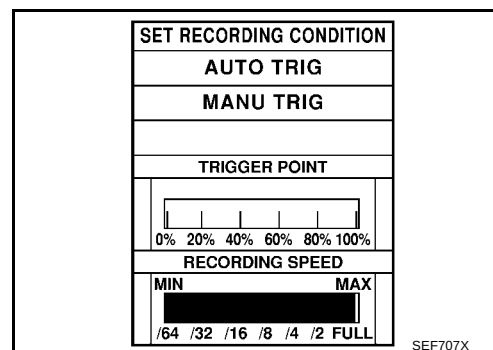
1. "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT-II 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-II OPERATION MANUAL.



2. "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.



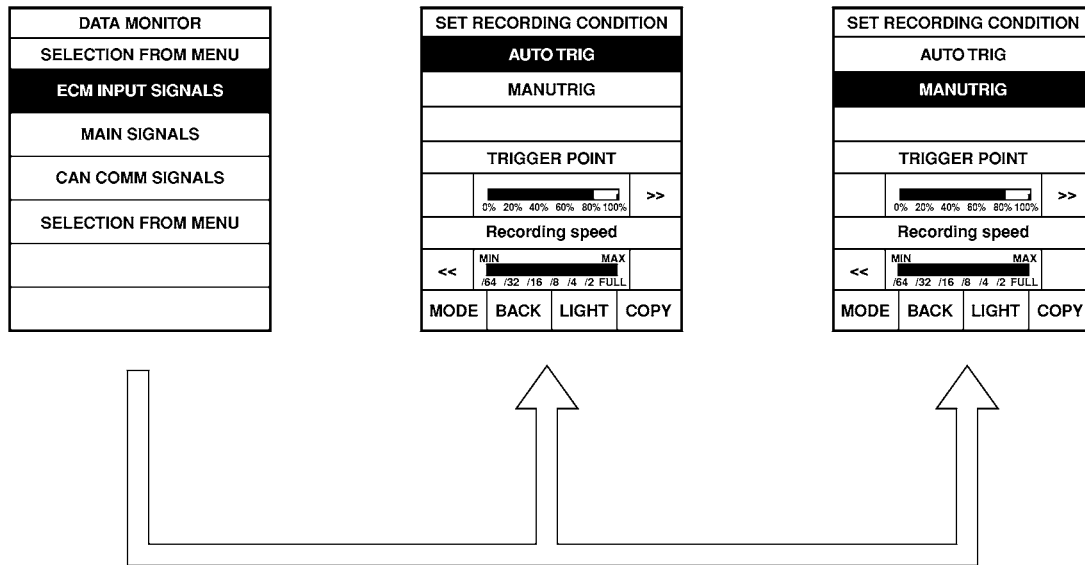
Operation

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.
- While narrowing down the possible causes, CONSULT-II 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-24, "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-II 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.



PBIB0197E

Generic Scan Tool (GST) Function DESCRIPTION

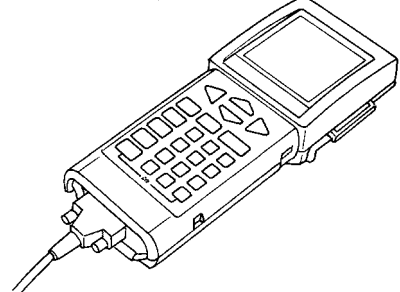
EBS0003Q

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.

Generic Scan Tool (GST): Sample



SEF139P

FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-43, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.

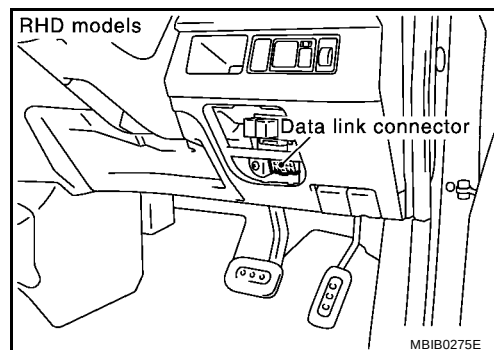
TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

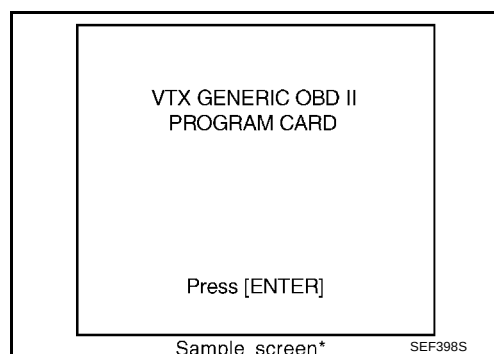
Diagnostic test mode		Function
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode is not applicable on this vehicle.
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

GST INSPECTION PROCEDURE

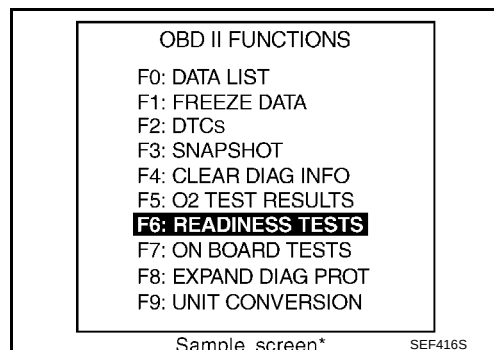
1. Turn ignition switch OFF.
2. Connect "GST" to data link connector, which is located under drivers side dash panel near the fuse box cover.
3. Turn ignition switch ON.



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-II Reference Value in Data Monitor Mode

EBS0003R

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	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54% - 155%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	Revving engine from idle to 3,000 rpm quickly.	LEAN ↔ RICH
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRTL SEN1 THRTL SEN2*1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
TURBO BST SEN	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	At idle	Approximately 1.5V
		At 2,500 rpm	Approximately 1.2V
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

TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

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
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 is in neutral position. (Forward direction)	OFF
		Steering wheel is 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 is OFF 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 is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Shift lever: 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: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0° - 10° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	-5° - 5°C
		When revving up to 2,000 rpm quickly	Approx. 0° - 20°C

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TROUBLE DIAGNOSIS

[CR (WITH EURO-OBD)]

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving up to 2,000 rpm quickly	Approx. 0% - 50%
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 seconds 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 is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (210°F)	LOW*2
		Engine coolant temperature is 105°C (212°F) or more	HIGH*2
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed is below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		ON
	● Engine speed: Above 3,800 rpm		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 mile)
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: below 3,600 rpm		Approx. 50%
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle		1.0 - 4.0V
	● Air conditioner switch: OFF		
CAN COMM	● Ignition switch: ON		OK
CAN CIRC 1			OK
CAN CIRC 2			OK or UNKWN
CAN CIRC 3			OK
CAN CIRC 4			OK
CAN CIRC 5			UNKWN
CAN CIRC 6			OK
CAN CIRC 7			OK
CAN CIRC 8			UNKWN
CAN CIRC 9			OK or UNKWN

*1 : 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.

*2: Models without air conditioner, cooling fan operates only ON and OFF operation, but CONSULT-II display will change OFF, LOW and HI depends on engine coolant temperature.

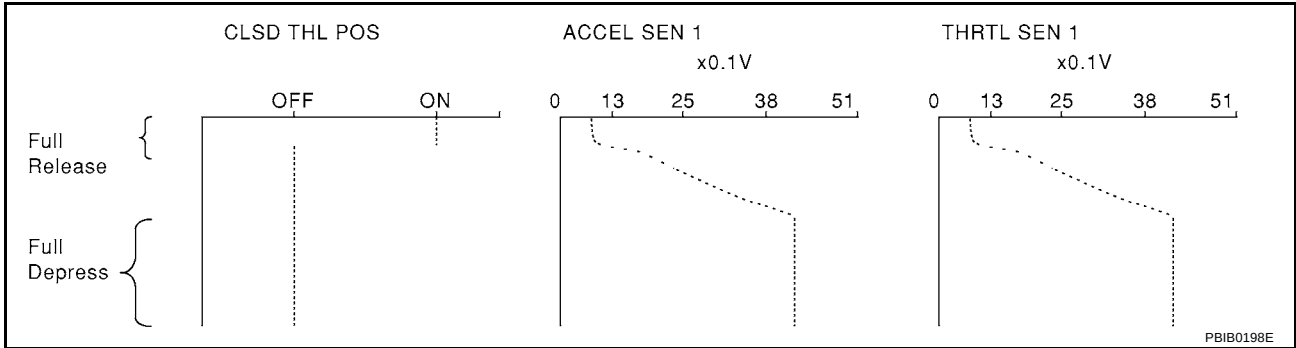
Major Sensor Reference Graph in Data Monitor Mode

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

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

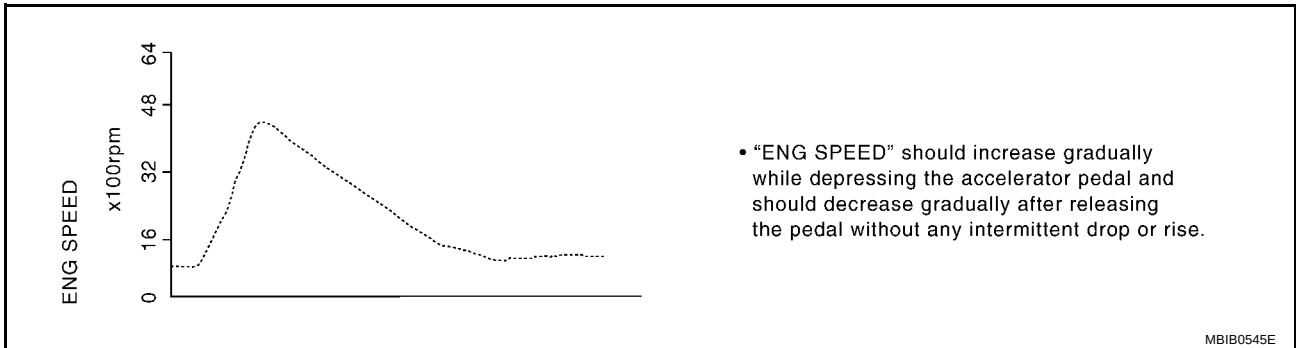
Below is the data for "CLSD THL POS", "ACCEL SEN 1" and "THRTL SEN 1" when depressing the accelerator pedal with the ignition switch "ON" and with selector lever in "D" position (A/T models) or with shift lever in "1st" position (M/T models).

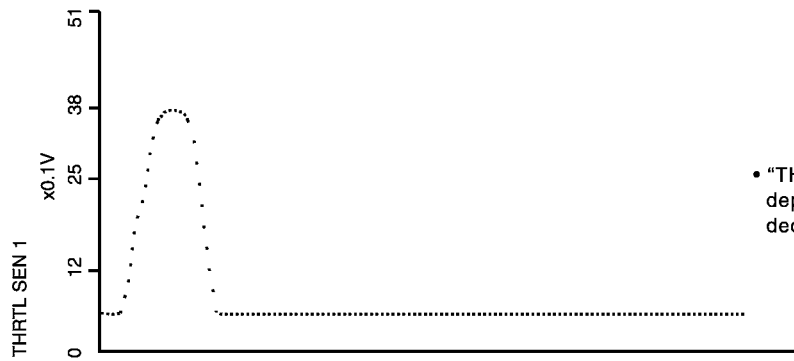
The signal of "ACCEL SEN 1" and "THRTL SEN 1" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



ENG SPEED, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for "ENG SPEED", "THRTL SEN 1", "HO2S2 (B1)", "HO2S1 (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.

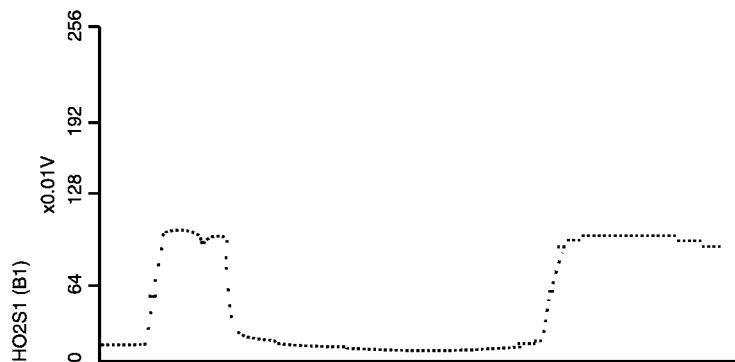




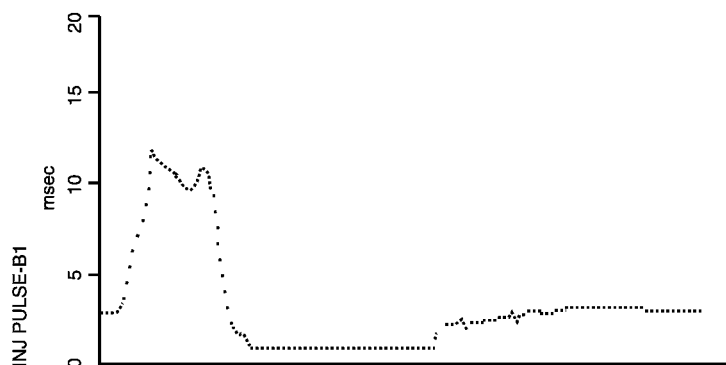
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

EBS0003T

The specification (SP) value indicates the tolerance of the value that is displayed in "DATA MONITOR (SPEC)" mode of CONSULT-II 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 MI.

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 (The mean value of air-fuel ratio feedback correction factor per cycle)

Testing Condition

EBS0003U

- Vehicle driven distance: More than 5,000 km (3,017 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)
- Transmission: Warmed-up*¹
- Electrical load: Not applied*²
- Engine speed: Idle

*1: For 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).

For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.

*2: Rear window defogger switch, air conditioner switch, lighting switch are "OFF". Steering wheel is straight ahead.

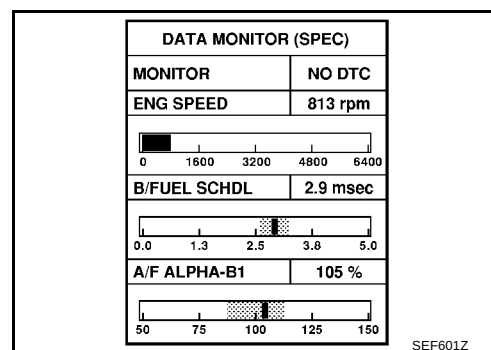
Inspection Procedure

EBS0003V

NOTE:

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

1. Perform [EC-68, "Basic Inspection"](#).
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL" and "A/F ALPHA-B1" in "DATA MONITOR (SPEC)" mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-110, "Diagnostic Procedure"](#).



[CR (WITH EURO-OBD)]

Diagnostic Procedure

CHECK A/F ALPHA-B1



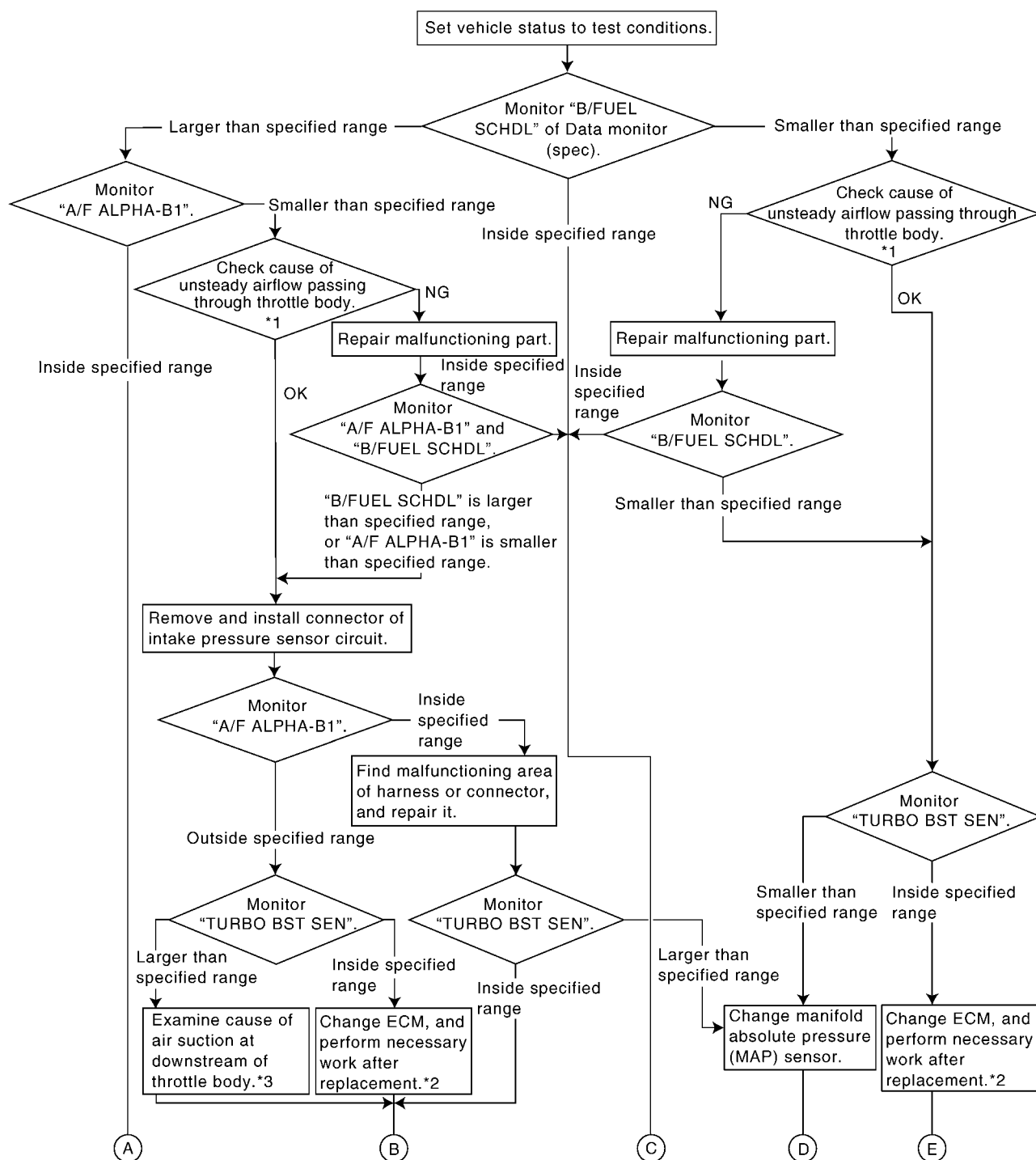
[CR (WITH EURO-OBD)]



TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[CR (WITH EURO-OBD)]

CHECK B/FUEL SCHDL



*1

Inspection Location

- Crushed air duct
- Improper sealing of air cleaner element
- Unevenly dirty air cleaner element
- Different specification of intake air system part

etc.

*2

Refer to ECM Removal and Installation procedure in Service Manual.

*3

Inspection Location

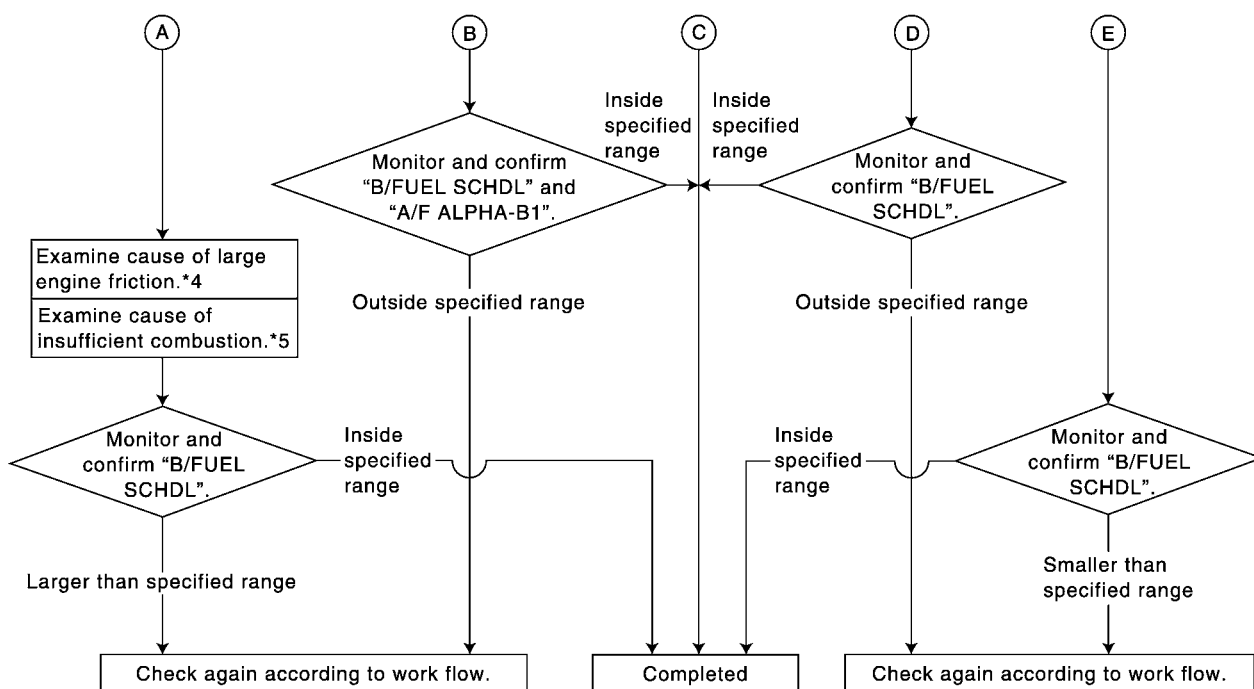
- Disconnection, looseness, or cracks of air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open sticking, breakage, hose disconnection, or cracks of blow-by gas control valve
- Disconnection or cracks of EVAP canister purge hose, open sticking of EVAP canister purge volume control valve
- Improper sealing of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts.
- Improper sealing of intake air system part gasket

etc.

PBIA1516E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[CR (WITH EURO-OBD)]



*4

Inspection Location

- Overhigh engine oil level
- Engine oil viscosity
- Over-tensioned belt of power steering, alternator, and air conditioner compressor, unusual noise, or binding of pulley
- Unusual noise of engine
- Unusual noise of gear change etc.

*5

Inspection Location

- EGR valve sticking
- Improper valve clearance
- Malfunction of intake valve timing control function
- Improper installation of camshaft sprocket etc.

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

[CR (WITH EURO-OBDD)]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS0003X

Intermittent incidents (I/I) 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 I/I 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 I/I Report Situations

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

Diagnostic Procedure

EBS0003Y

1. INSPECTION START

Erase (1st trip) DTCs. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "Incident Simulation Tests", "Ground Inspection".

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "Incident Simulation Tests".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace.

[CR (WITH EURO-OBD)]

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EC-115

POWER SUPPLY CIRCUIT FOR ECM

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1 115 116	B B B	ECM ground	[Engine is running] ● Idle speed	Engine ground
109	PU	Ignition switch	[Ignition switch "OFF"]	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00040

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

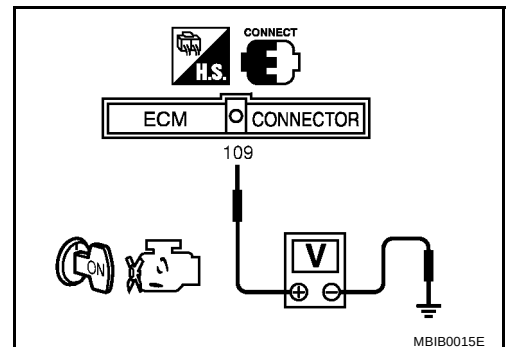
1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101
- Fuse block (J/B) connector M16
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

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

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

4. 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 F1, E50
- Harness for open or short between ECM and engine ground

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

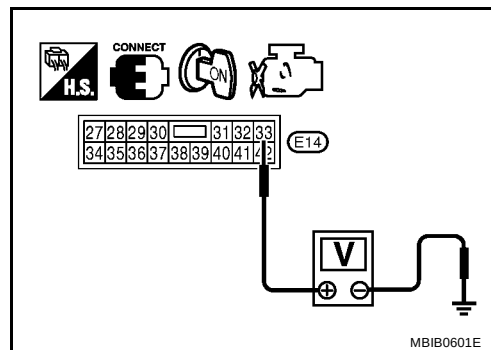
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Check voltage between IPDE E/R harness connector E14 terminal 33 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> Go to [EC-376, "IGNITION SIGNAL"](#).
NG >> GO TO 7.

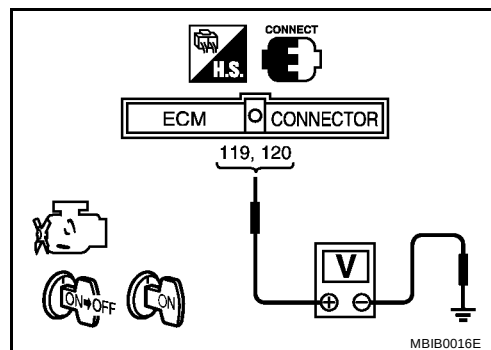
**7. CHECK ECM POWER SUPPLY CIRCUIT-III**

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II 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 8.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.



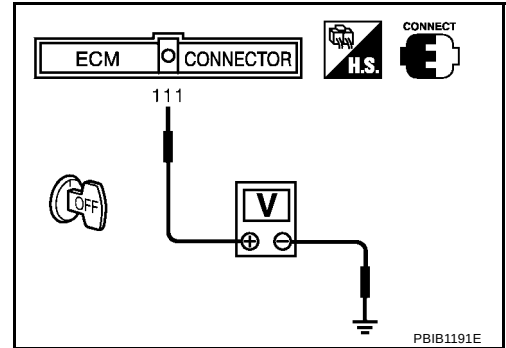
8. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch "OFF".
2. Check voltage between ECM terminal 111 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 10.



9. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 32. 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.

10. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 29. 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 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK 20A FUSE

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

OK or NG

- OK >> GO TO 13.
NG >> Replace 20A fuse.

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

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 13.

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

13. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

OK >> Replace IPDM E/R.

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

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DTC U1000, U1001 CAN COMMUNICATION LINE

[CR (WITH EURO-OBD)]

DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

EBS00042

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

EBS00043

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted.)
U1001*2 1001*2			

*1:These self-diagnosis have the one trip detection logic.

*2:The MI will not light up for this self-diagnosis.

DTC Confirmation Procedure

EBS00044

1. Turn ignition switch "ON" and wait at least 3 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If 1st trip DTC or DTC is detected, go to [EC-122, "Diagnostic Procedure"](#) .

DTC U1000, U1001 CAN COMMUNICATION LINE

[CR (WITH EURO-OBD)]

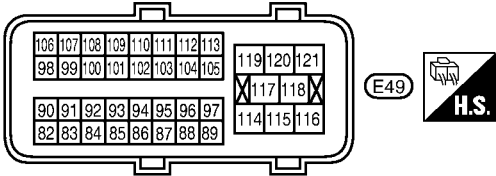
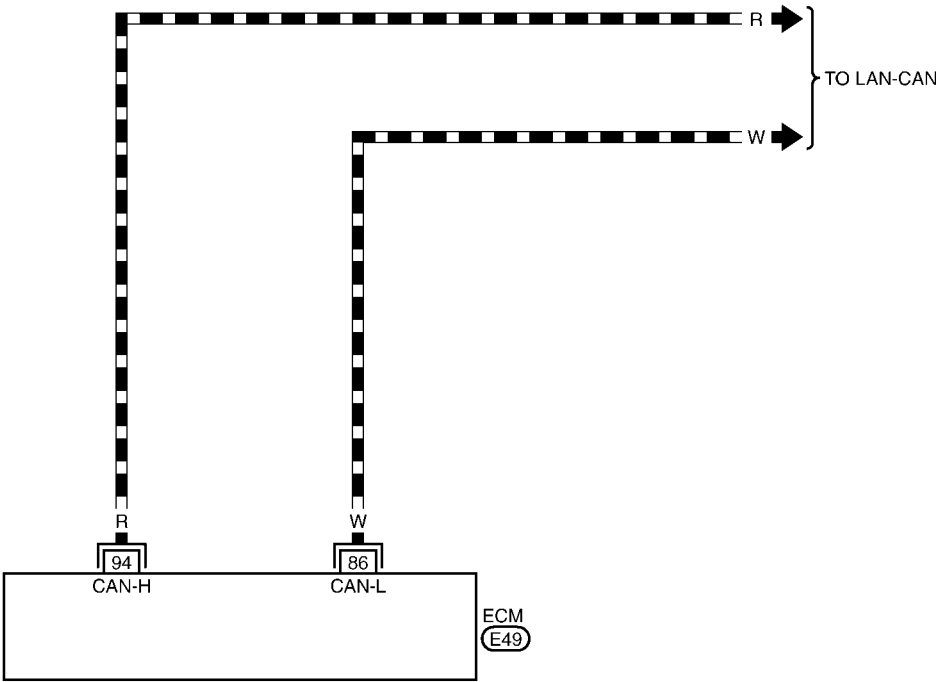
Wiring Diagram

EBS000O45

EC-CAN-01

EC

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



MBWA0268E

Diagnostic Procedure

1. INSPECTION START

1. Turn ignition switch "ON".
2. Select "CAN DIAG SUPPORT MNTR" in "DATA MONITOR" mode with CONSULT-II.
3. Print out the CONSULT-II screen.

A/T Models with EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	OK	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	OK	CAN CIRC 9	UNKWN

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A/T Models without EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	OK	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	UNKWN	CAN CIRC 9	UNKWN

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M/T Models with EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	OK	CAN CIRC 9	UNKWN

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M/T Models without EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	UNKWN	CAN CIRC 9	UNKWN

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>> Go to [LAN-3, "Precautions When Using CONSULT-II"](#) .

DTC P0011 IVT CONTROL

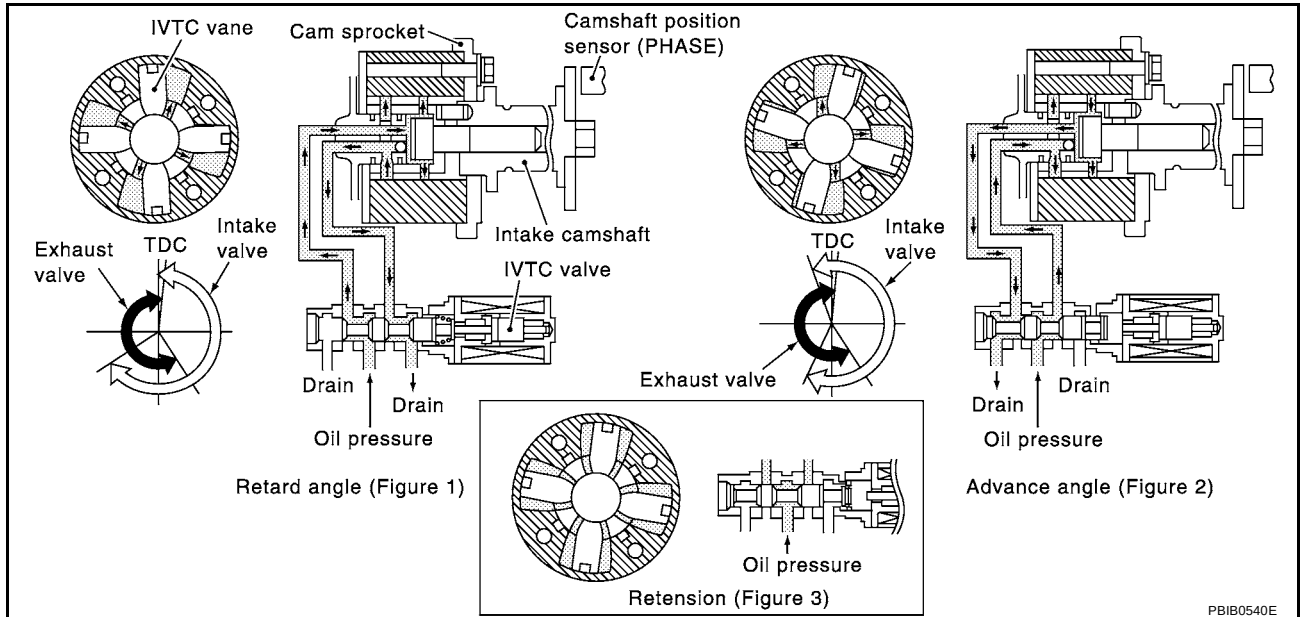
PPF:23796

Description SYSTEM DESCRIPTION

EBS00047

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed signal*	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-II Reference Value in Data Monitor Mode

EBS00048

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM (B1)	- Engine: After warming up - Shift lever: N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No-load	Idle
	When revving up to 2,000 rpm quickly	Approx. 0° - 20°CA
INT/V SOL (B1)	- Engine: After warming up - Shift lever: N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No-load	Idle
	When revving up to 2,000 rpm quickly	Approx. 0% - 50%

On Board Diagnosis Logic

EBS00049

The MI will not light up for this self-diagnosis.

DTC P0011 IVT CONTROL

[CR (WITH EURO-OBD)]

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	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) ● Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction is detected.

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

EBS0004A

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for "DTC P1111". See [EC-272](#).
- 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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105°C (148 - 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.)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

4. If 1st trip DTC is detected, go to [EC-125, "Diagnostic Procedure"](#)

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure**1. CHECK CRANKSHAFT POSITION SENSOR (POS)**

Refer to [EC-245, "Component Inspection"](#) .

OK or NG

OK >> GO TO 2.

NG >> Replace crankshaft position sensor (POS).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-251, "Component Inspection"](#) .

OK or NG

OK >> GO TO 3.

NG >> Replace camshaft position sensor (PHASE).

3. CHECK CAMSHAFT (INTAKE)

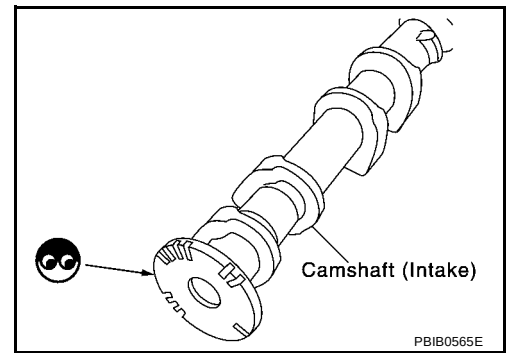
Check the following.

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

OK or NG

OK >> GO TO 4.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

**4. CHECK INTERMITTENT INCIDENT**

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For wiring diagram refer to CKP sensor (POS) [EC-242](#) and CMP sensor (PHASE) [EC-248](#) .

>> INSPECTION END

DTC P0031, P0032 HO2S1 HEATER

[CR (WITH EURO-OBD)]

DTC P0031, P0032 HO2S1 HEATER

PFP:22690

Description SYSTEM DESCRIPTION

EBS0004C

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS0004D

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up	ON
	● Engine speed: Below 3,600 rpm	
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

EBS0004E

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 0032	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

EBS0004F

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-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.

DTC P0031, P0032 HO2S1 HEATER

[CR (WITH EURO-OBD)]

3. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to [EC-129, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEP058Y

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. Start engine and run it for at least 6 seconds at idle speed.
 4. Turn ignition switch "OFF" and wait at least 10 seconds.
 5. Start engine and run it for at least 6 seconds at idle speed.
 6. Select "MODE 3" with GST.
 7. If DTC is detected, go to [EC-129, "Diagnostic Procedure"](#).
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

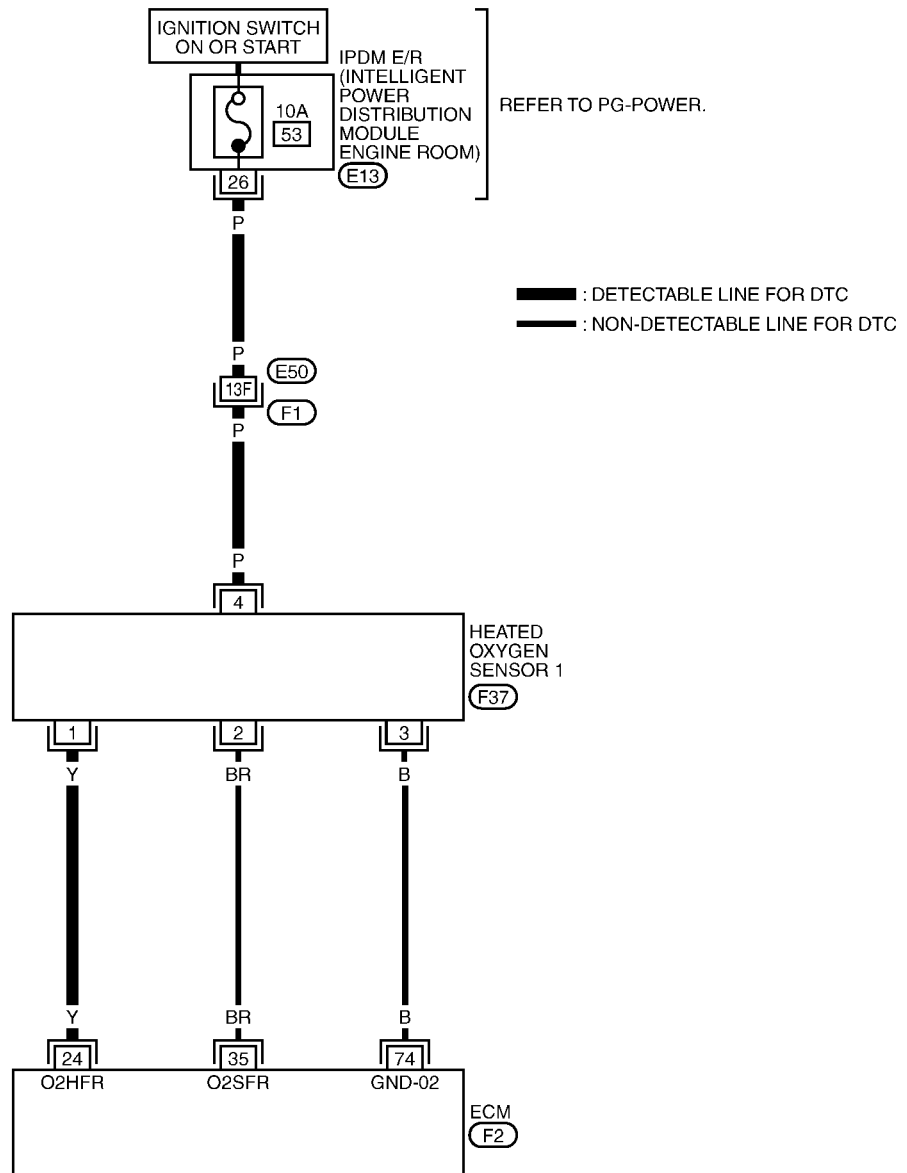
DTC P0031, P0032 HO2S1 HEATER

[CR (WITH EURO-OBD)]

Wiring Diagram

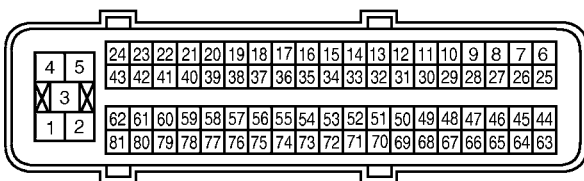
EBS0004G

EC-HO2S1H-01



15	16	17	18	19
20	21	22	23	24
25	26			

(E13)
BR



(F2)



(F37)
G

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0269E

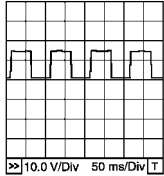
DTC P0031, P0032 HO2S1 HEATER

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	Y	Heated oxygen sensor 1 heater	[Engine is running] ● Warm-up condition. ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

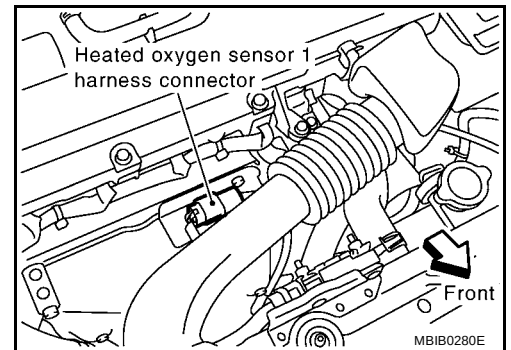
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS0004H

1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch "ON".

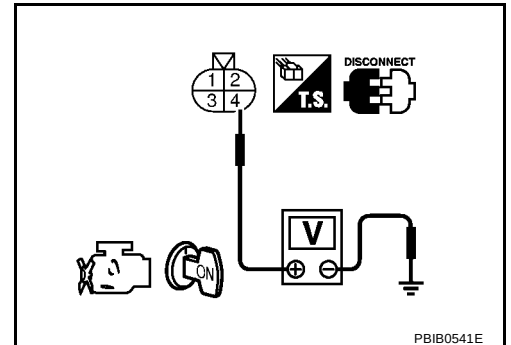


4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R connector E13
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

3. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 24 and HO2S1 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 4.

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

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-130, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1 HEATER

EBS0004I

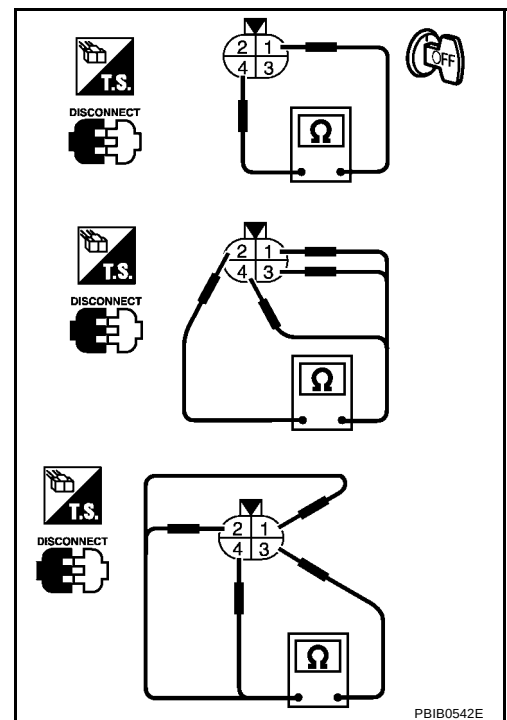
1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω at 25°C (77°F)
2 and 1, 3, 4	$\infty \Omega$ (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, replace heated oxygen sensor 1.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



PBIB0542E

Removal and Installation HEATED OXYGEN SENSOR 1

EBS0004J

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

DTC P0037, P0038 HO2S2 HEATER

[CR (WITH EURO-OBD)]

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description SYSTEM DESCRIPTION

EBS0004K

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
Engine coolant temperature sensor	Engine coolant temperature		
Manifold absolute pressure (MAP) sensor	Amount of intake air		

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 one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS0004L

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed is Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load	ON
	● Engine speed: Above 3,800 rpm	OFF

On Board Diagnosis Logic

EBS0004M

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	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	Heated oxygen sensor 2 heater control circuit high	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

EBS0004N

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-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to [EC-134, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

1. Start engine and warm it up 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 one minute under no load.
 4. Let engine idle for one minute.
 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 at least one minute under no load.
 7. Let engine idle for one minute.
 8. Select "MODE 3" with GST.
 9. If DTC is detected, go to [EC-134, "Diagnostic Procedure"](#).
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

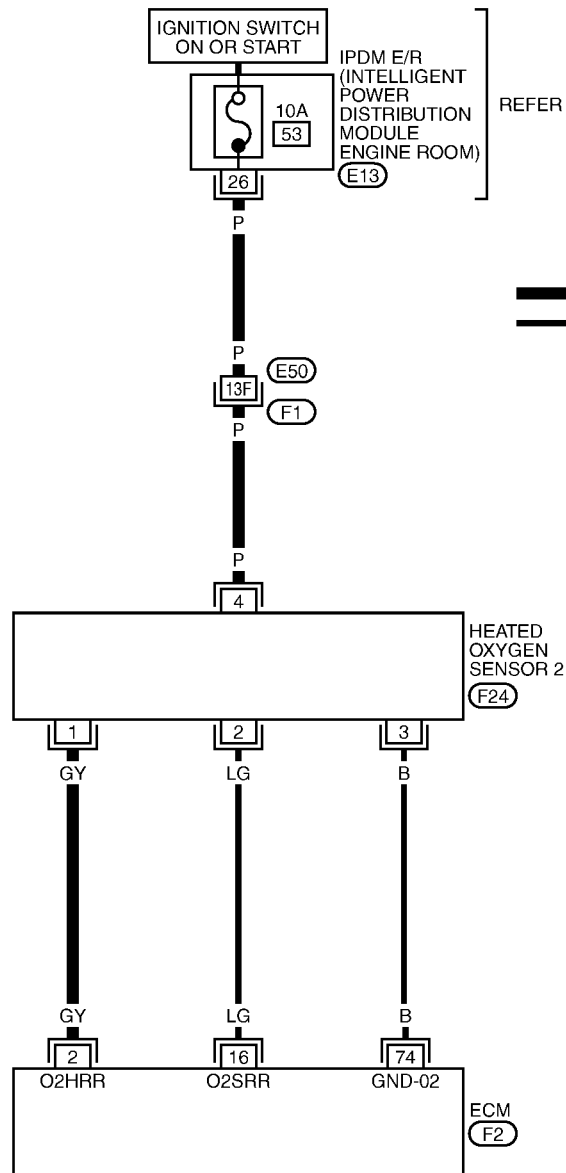
DTC P0037, P0038 HO2S2 HEATER

[CR (WITH EURO-OBD)]

Wiring Diagram

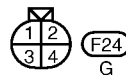
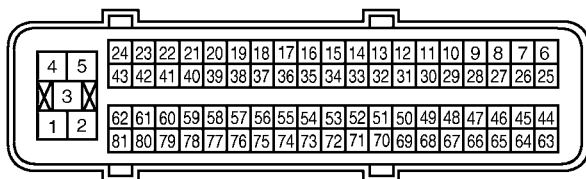
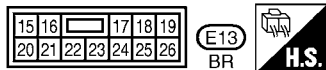
EBS00040

EC-HO2S2H-01



REFER TO PG-POWER.

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



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0270E

DTC P0037, P0038 HO2S2 HEATER

[CR (WITH EURO-OBD)]

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.

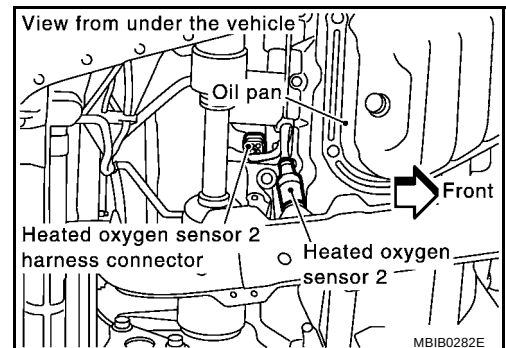
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	GY	Heated oxygen sensor 2 heater	[Engine is running] - Engine speed is Below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - 1.0V
			[Ignition switch "ON"] - Engine stopped [Engine is running] - Engine speed is above 3,800 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS0004P

1. CHECK HO2S2 POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect heated oxygen sensor 2 harness connector.
- Turn ignition switch "ON".

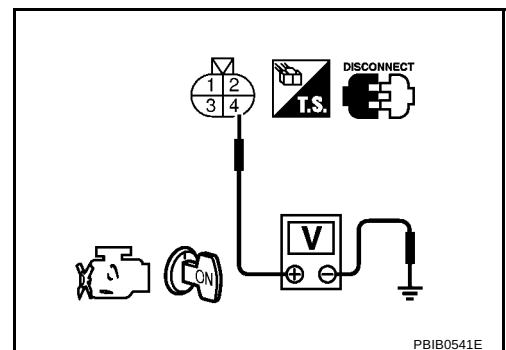


- Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R connector E13
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

3. 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 2 and HO2S2 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 4.

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

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-135, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection
HEATED OXYGEN SENSOR 2 HEATER

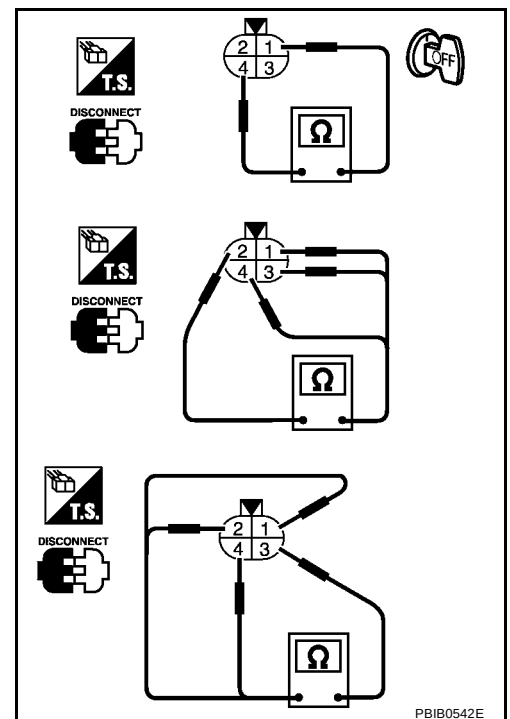
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω at 25°C (77°F)
2 and 1, 3, 4	$\infty \Omega$ (Continuity should not exist)
3 and 1, 2, 4	

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



EBS0004Q

PBIB0542E

EBS0004R

Removal and Installation
HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITH EURO-OBDD)]

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR

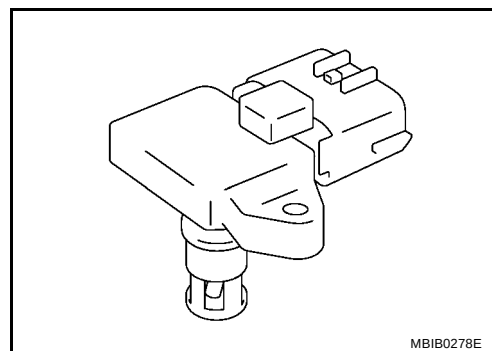
PFP:22365

Component Description

EBS000E1

The manifold absolute pressure (MAP) sensor is placed intake manifold corrector. It detects intake manifold pressure and sends the voltage signal to the ECM, ECM uses the signal to compute intake air volume value.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increase, the voltage rises.



On Board Diagnosis Logic

EBS000E2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0107 0107	Manifold absolute 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.) ● Manifold absolute pressure sensor
P0108 0108	Manifold absolute pressure 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) ● Manifold absolute pressure sensor ● Intake air leaks

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Manifold absolute pressure sensor circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut.

DTC Confirmation Procedure

EBS000E3

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If the 1st trip DTC is detected, go to [EC-138. "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

WITH GST

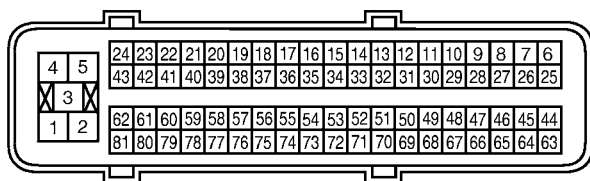
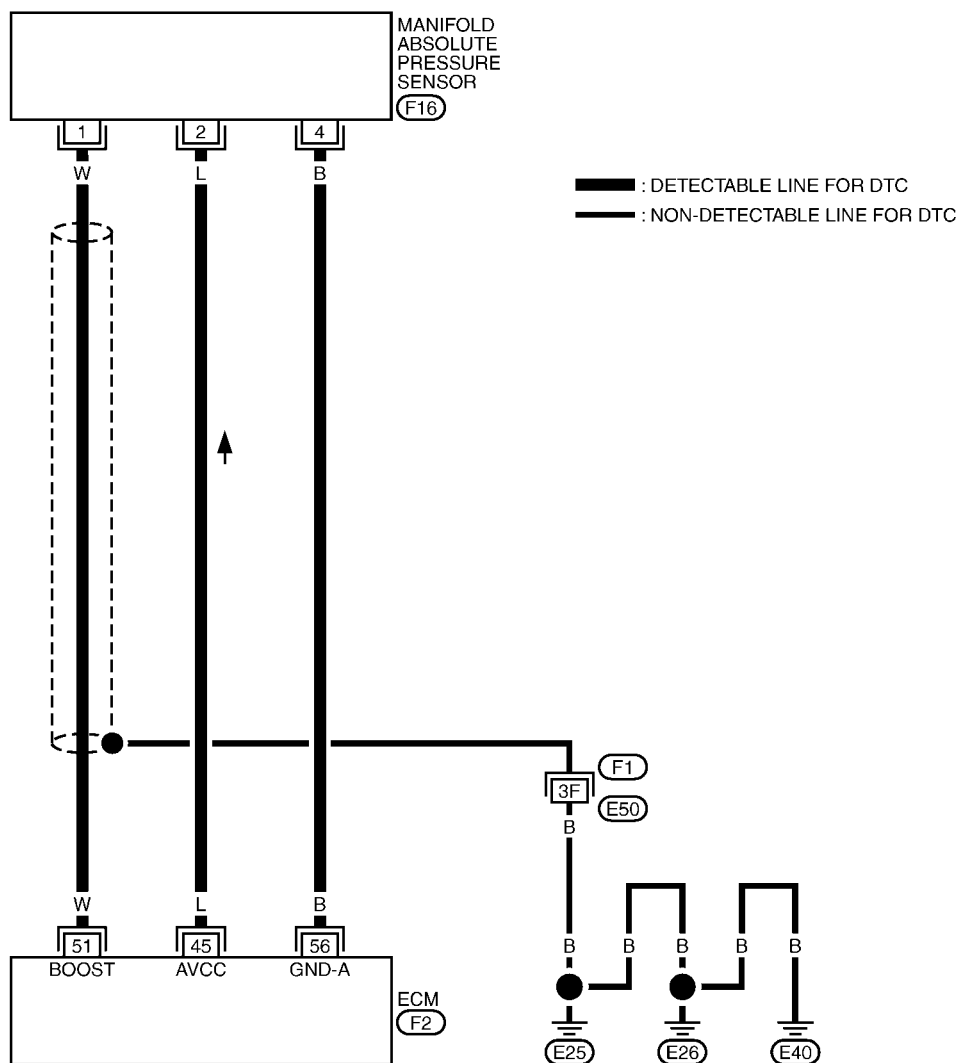
Follow the procedure "WITH CONSULT-II" above.

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITH EURO-OBD)]

Wiring Diagram

EBS000E4

EC-AP/SEN-01



F2



4 3 2 1

F16
GY

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0304E

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITH EURO-OBD)]

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.

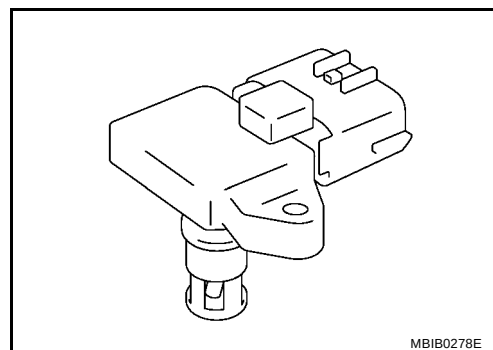
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V

Diagnostic Procedure

EBS000E5

1. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect manifold absolute pressure sensor harness connector.
- Turn ignition switch "ON".



MBIB0278E

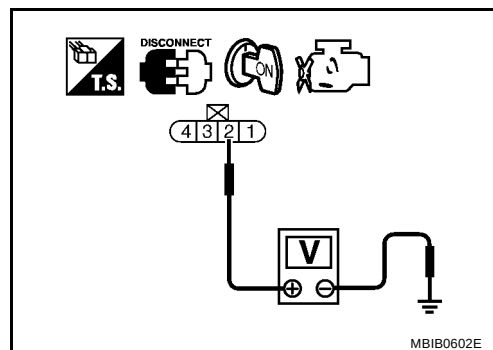
- Check voltage between MAP sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 2.

NG >> Repair harness or connectors.



MBIB0602E

2. CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch "OFF".
- Check harness continuity between MAP sensor terminal 4 and ECM terminal 56
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 harness or connectors.

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITH EURO-OBD)]

3. CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAP sensor terminal 1 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 4.

NG >> Repair harness or connectors.

4. CHECK MAP SENSOR

Refer to [EC-139, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace manifold absolute pressure sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection MANIFOLD ABSOLUTE PRESSURE SENSOR

EBS000E6

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51(manifold absolute pressure sensor signal) and ground.

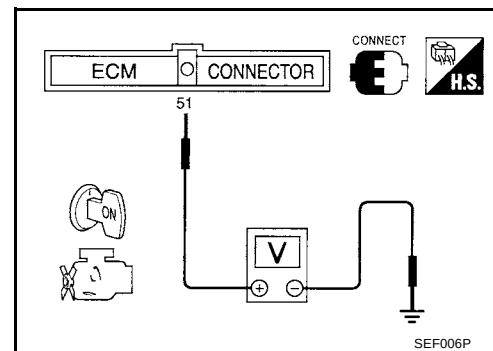
NOTE:

- To avoid the affection of intake manifold vacuum, Check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depends on atmospheric pressure and altitude.

4. Measure the atmospheric pressure.

NOTE:

As atmospheric pressure describe on synoptic chart is value at sea level, please compensate the actual pressure with the following chart.

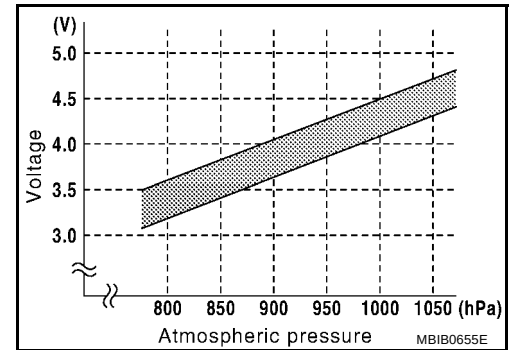


Altitude	Compensated pressure
0m	0hPa
200m	-24hPa
400m	-47hPa
600m	-70hPa
800m	-92hPa
1,000m	-114hPa
1,500m	-168hPa
2,000m	-218hPa

5. Check the manifold absolute pressure sensor value corresponds to the atmospheric pressure.

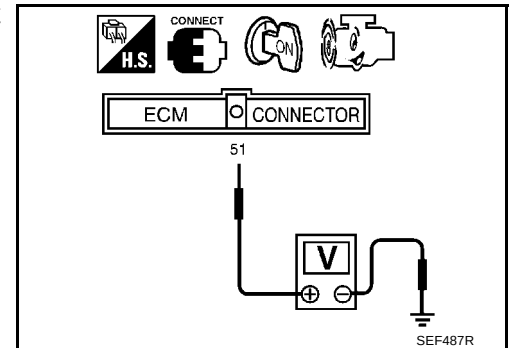
DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITH EURO-OBD)]

Atmospheric pressure	Voltage
800hPa	3.2 - 3.6v
850hPa	3.4 - 3.8v
900hPa	3.7 - 4.1v
960hPa	3.9 - 4.3v
1,000hPa	4.1 - 4.5v
1,050hPa	4.3 - 4.7v



6. Check the voltage between ECM terminal 51 and ground at idling and confirm the voltage difference between engine is stopped and at idling is within following chart.

Intake manifold vacuum	Voltage difference
-40kPa (-300mmHg)	1.6 - 2.0v
-53.3kPa (-400mmHg)	2.2 - 2.6v
-66.7kPa (-500mm)	2.8 - 3.2v
-80kPa (-600mmHg)	3.4 - 3.8v



Removal and Installation MANIFOLD ABSOLUTE PRESSURE SENSOR

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

EBS000E7

DTC P0112, P0113 IAT SENSOR

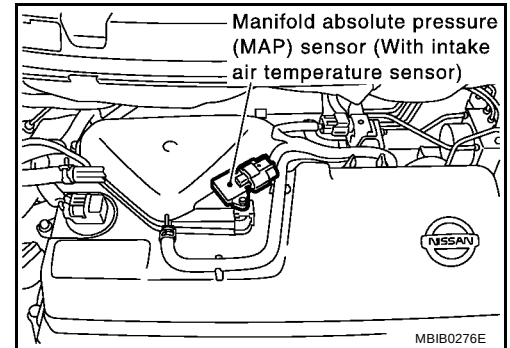
PFP:22630

Component Description

EBS00050

The intake air temperature sensor is built into manifold absolute pressure 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 temperature rise.



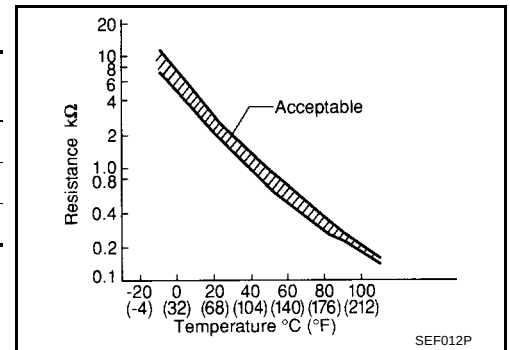
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are 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.



On Board Diagnosis Logic

EBS00051

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.	

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Intake air temperature sensor circuit	Intake air temperature is determined as 30°C (86°F).

DTC Confirmation Procedure

EBS00052

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-II

1. Turn ignition switch "ON".

DTC P0112, P0113 IAT SENSOR

[CR (WITH EURO-OBD)]

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to [EC-144, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y



WITH GST

Follow the procedure "With CONSULT-II" above.

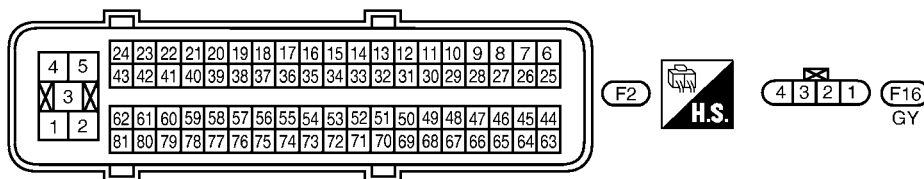
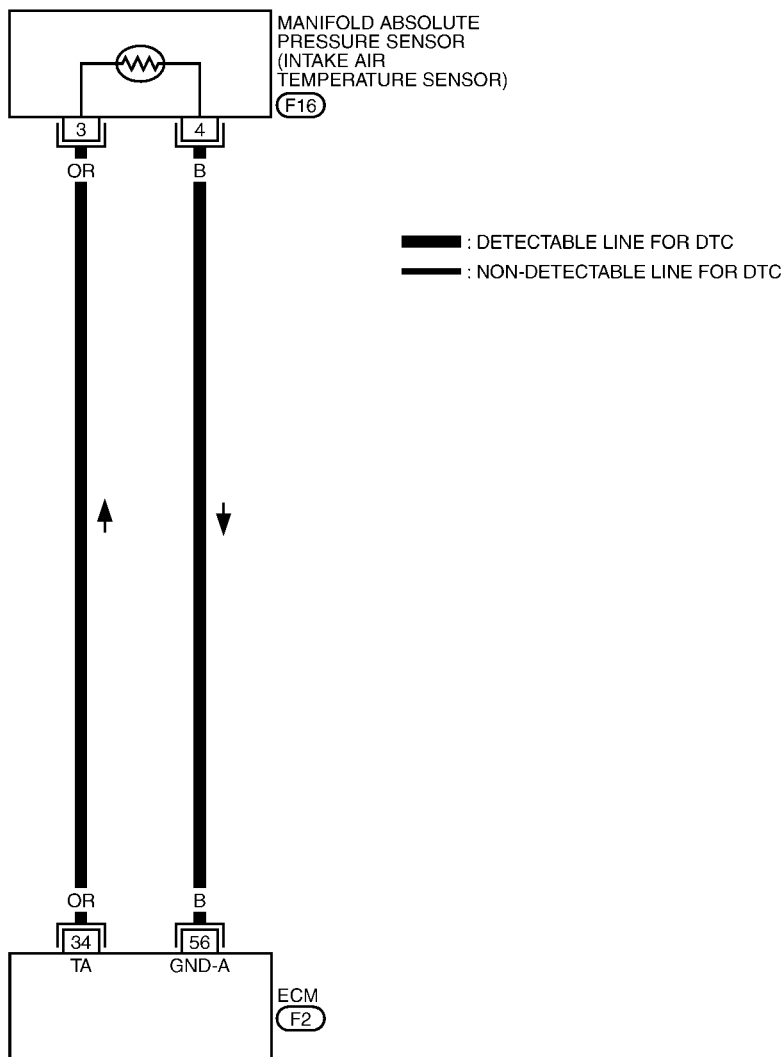
DTC P0112, P0113 IAT SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000053

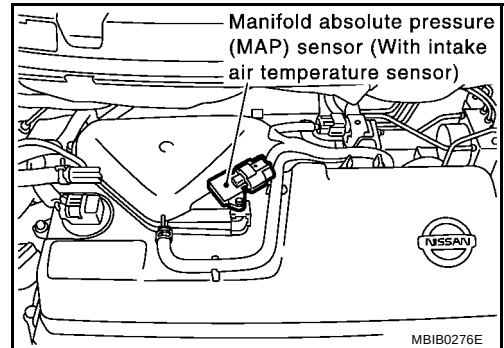
EC-IATS-01



MBWA0462E

Diagnostic Procedure**1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT**

1. Turn ignition switch "OFF".
2. Disconnect manifold absolute pressure sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch "ON".

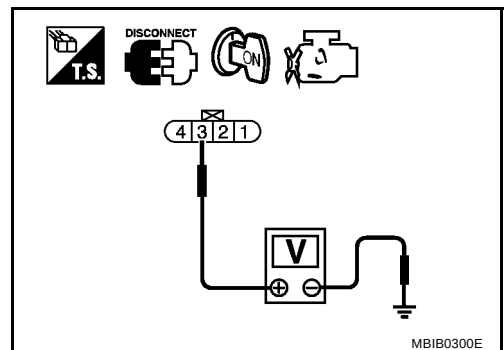


4. Check voltage between MAP sensor terminal 3 and ground.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 2.
NG >> Repair harness or connectors.

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

1. Turn ignition switch "OFF".
2. Check harness continuity between MAP sensor terminal 4 and ECM terminal 56.
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 3.
NG >> Repair harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-145, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 4.
NG >> Replace manifold absolute pressure sensor (with intake air temperature sensor).

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

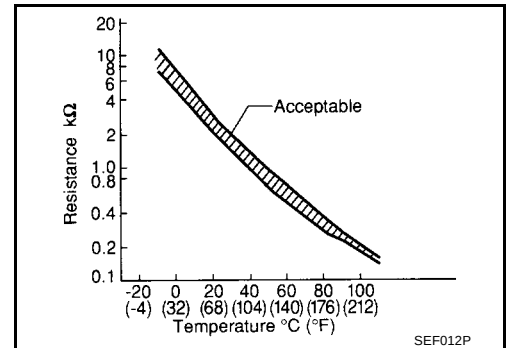
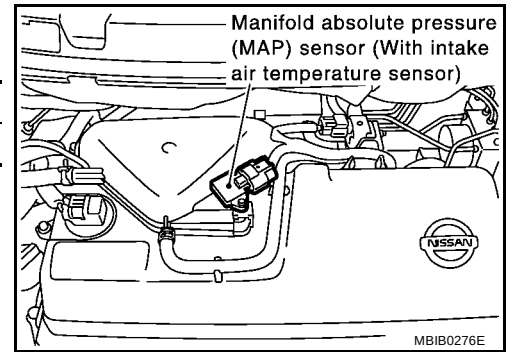
>> **INSPECTION END**

Component Inspection**INTAKE AIR TEMPERATURE SENSOR**

1. Check resistance between manifold absolute pressure sensor terminals 3 and 4 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace manifold absolute pressure sensor (with intake air temperature sensor).

**Removal and Installation****MANIFOLD ABSOLUTE PRESSURE SENSOR**

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

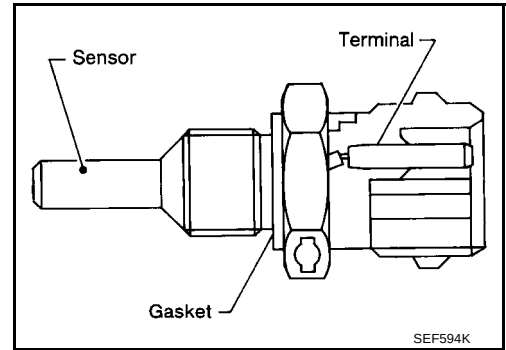
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

EBS00057

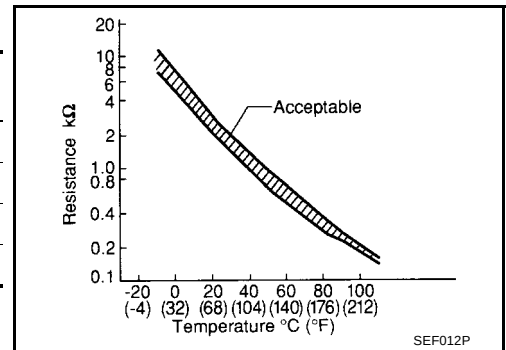
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

*: These data are reference values and are measured between ECM terminal 72 (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

EBS00058

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 this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

DTC P0117, P0118 ECT SENSOR

[CR (WITH EURO-OBD)]

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-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II 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

EBS00059

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to [EC-149, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

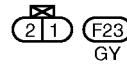
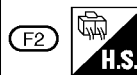
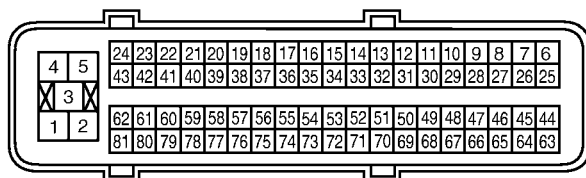
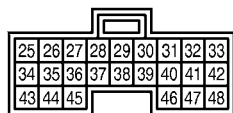
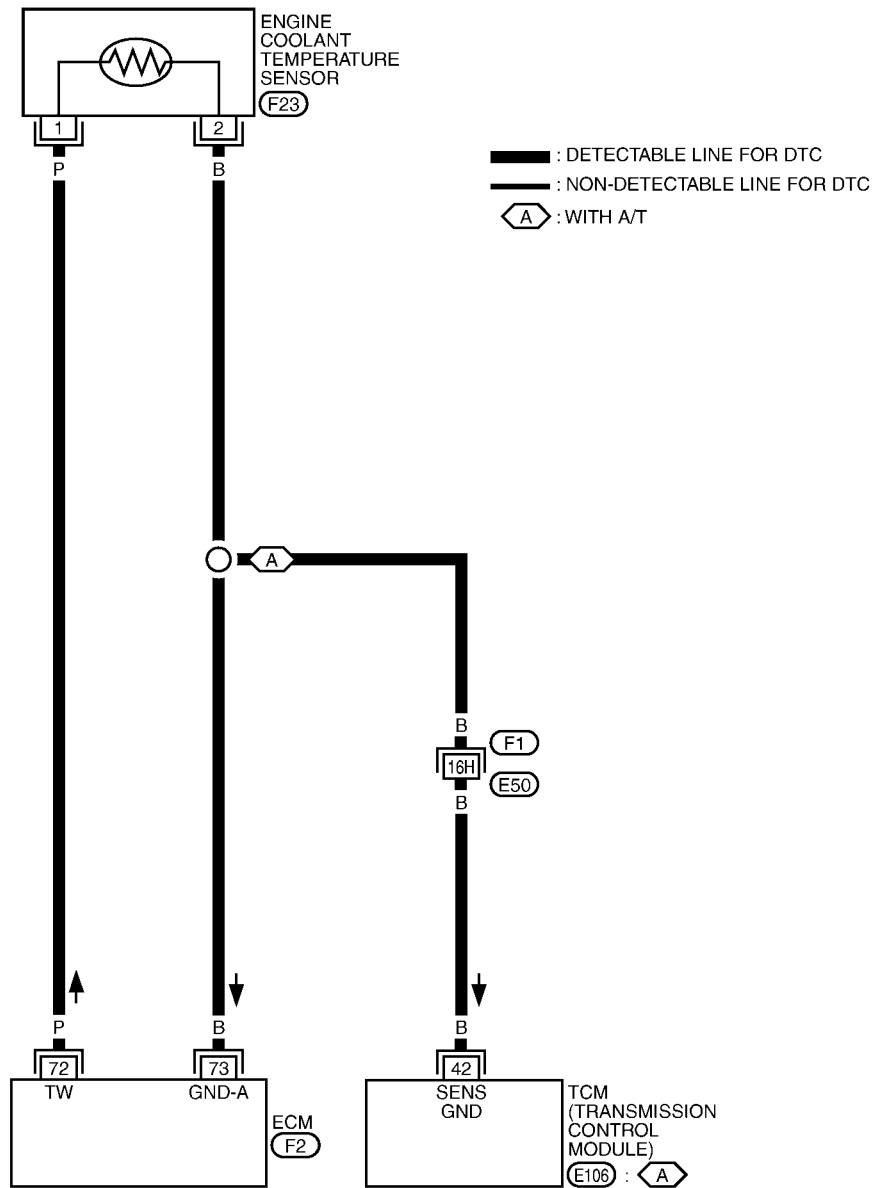
DTC P0117, P0118 ECT SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS0005A

EC-ECTS-01



REFER TO THE FOLLOWING.

F1 -SUPER MULTIPLE JUNCTION (SMJ)

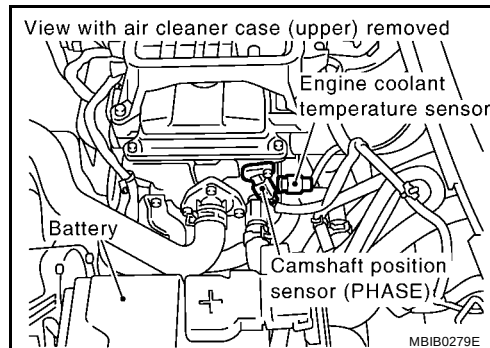
MBWA0271E

Diagnostic Procedure

EBS0005B

1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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

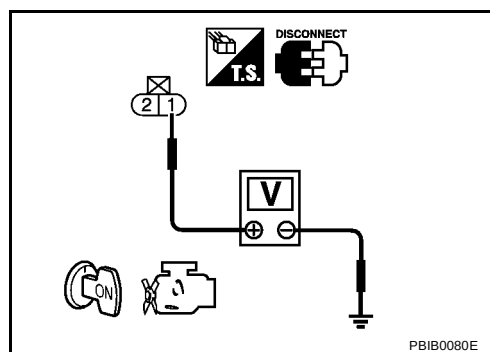


4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 2.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

**2. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check harness continuity between ECT sensor terminal 2 and engine ground. 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 E50, F1
- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM

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

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-150, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

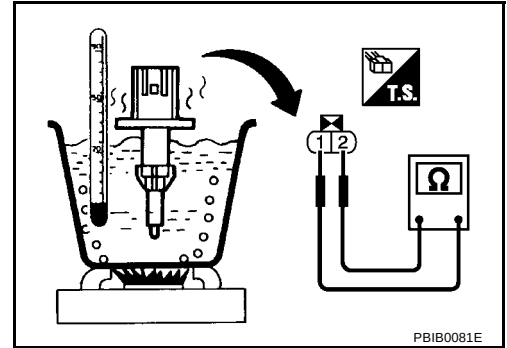
>> INSPECTION END

Component Inspection

ENGINE COOLANT TEMPERATURE SENSOR

EBS0005C

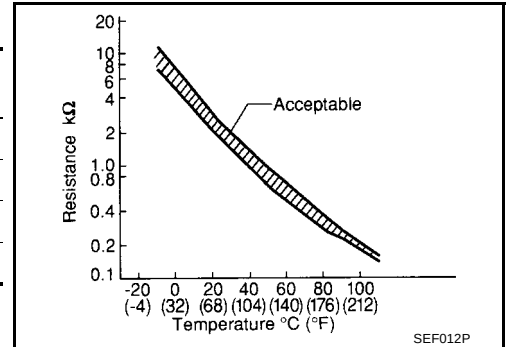
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<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

*: These data are reference values and are measured between ECM terminal 72 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

EBS0005D

Refer to [CO-22, "THERMOSTAT"](#) .

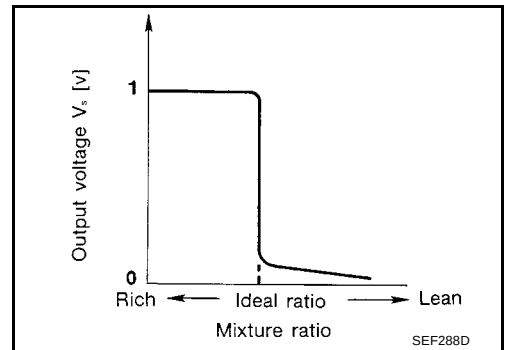
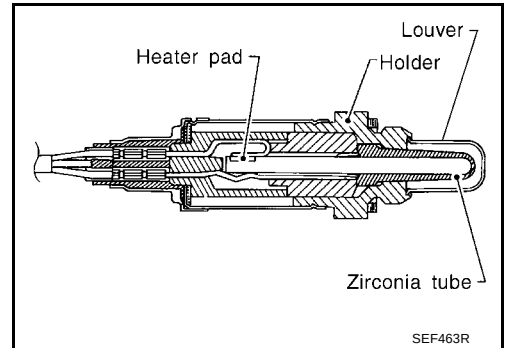
DTC P0132 HO2S1

PFP:22690

Component Description

EBS0005E

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

EBS0005F

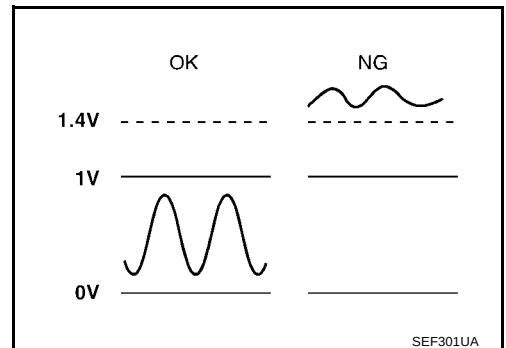
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS0005G

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 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 1

DTC Confirmation Procedure

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-II

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. Select "DATA MONITOR" mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to [EC-154, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

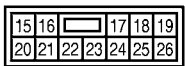
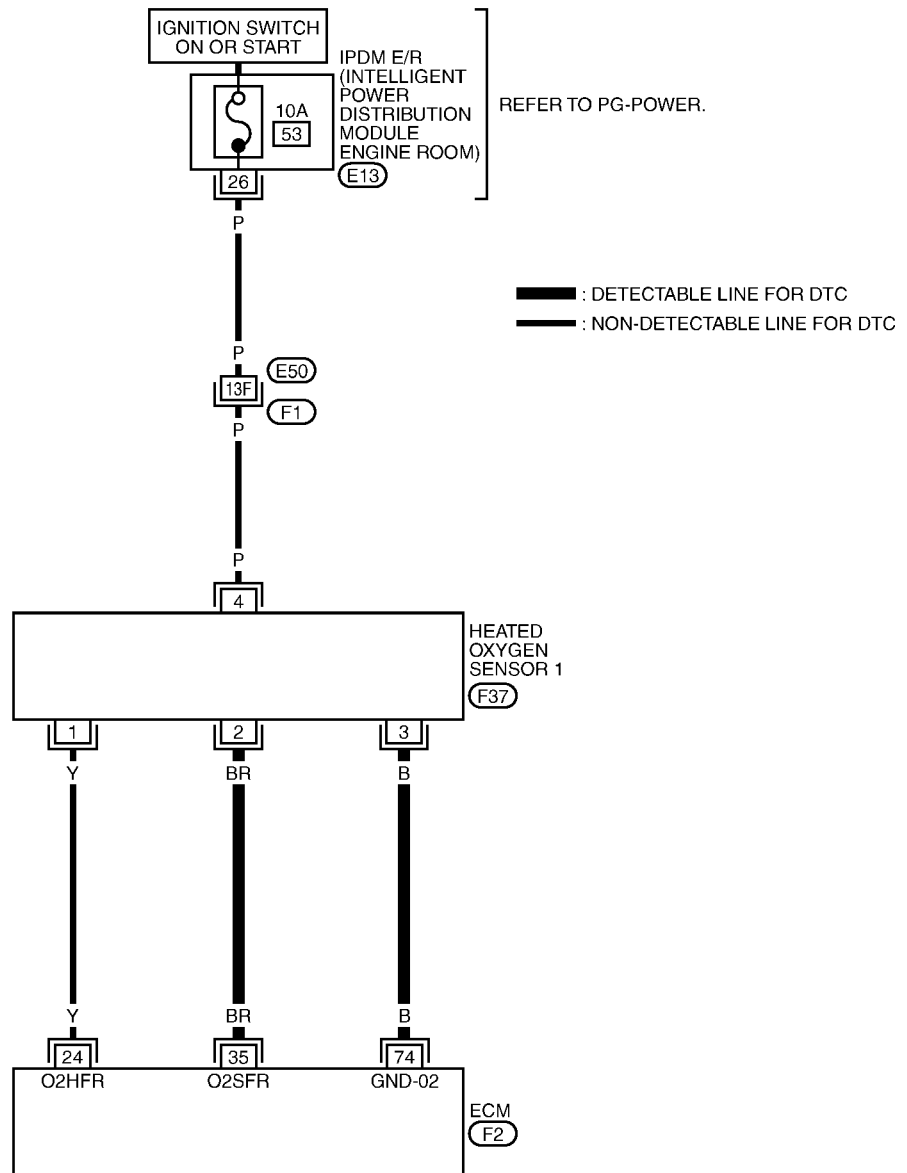
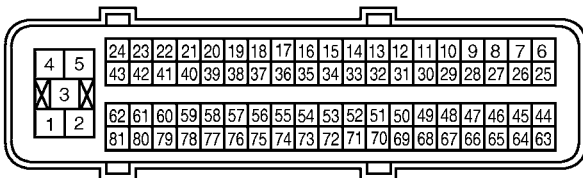
WITH GST

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch "OFF" and wait at least 10 seconds.
 3. Restart engine and let it idle for 2 minutes.
 4. Turn ignition switch "OFF" and wait at least 10 seconds.
 5. Restart engine and let it idle for 2 minutes.
 6. Select "MODE 3" with GST.
 7. If DTC is detected, go to [EC-154, "Diagnostic Procedure"](#).
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

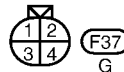
Wiring Diagram

EBS0005I

EC-HO2S1-01

E13
BR

F2

F37
G

REFER TO THE FOLLOWING.

(F1) -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

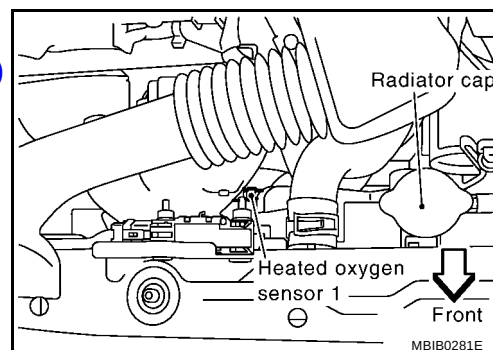
EBS0005J

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch "OFF".
2. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
Refer to Wiring Diagram.

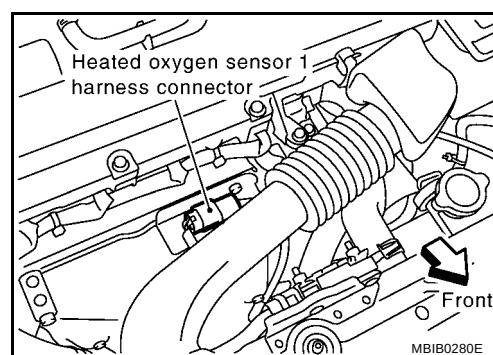
Continuity should exist.

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 power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

4. 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 HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector
3. 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 1

Refer to [EC-155, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection

HEATED OXYGEN SENSOR 1

EBS0005K

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

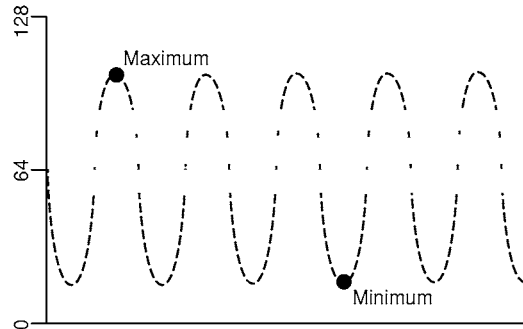
6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

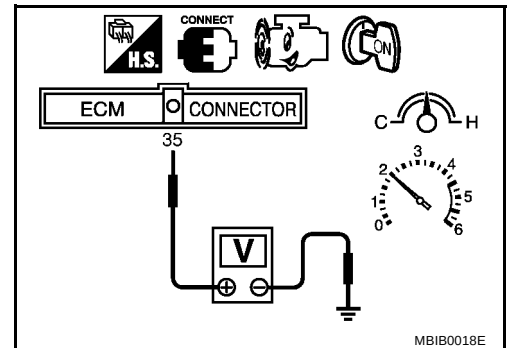
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



MBIB0018E

**Removal and Installation
HEATED OXYGEN SENSOR 1**

EBS0005L

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

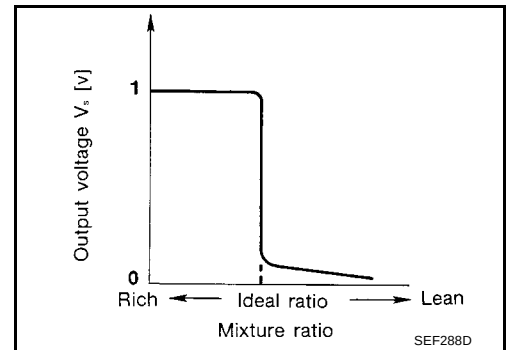
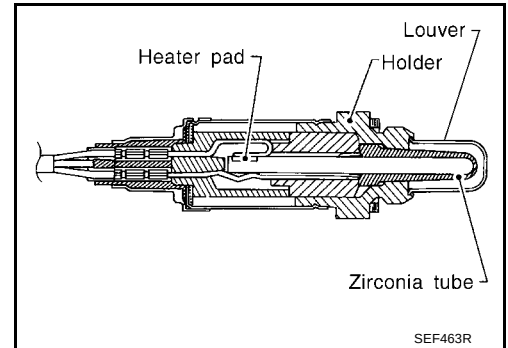
DTC P0133 HO2S1

PFP:22690

Component Description

EBS0005M

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

EBS0005N

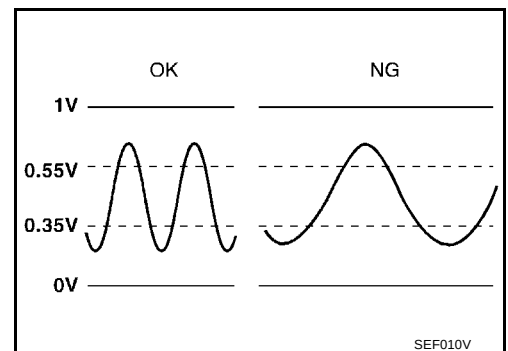
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS0005O

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 0133	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks ● Exhaust gas leaks ● Manifold absolute pressure sensor

DTC Confirmation Procedure

EBS0005P

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:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1) P0133" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 60 seconds.)

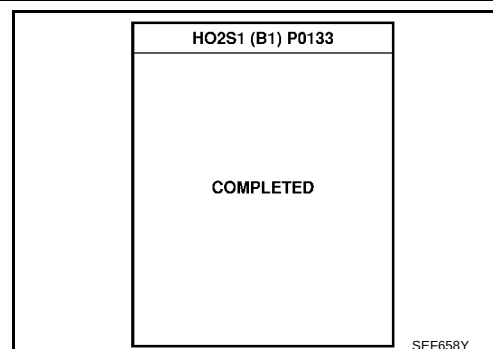
ENG SPEED	2,450 - 3,950 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.5 - 6.5 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-161, "Diagnostic Procedure"](#).



EBS0005Q

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

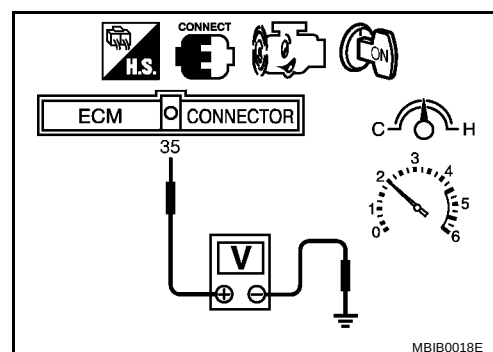
1. Start engine and warm it up to normal operating temperature.
 2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
 3. Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

times: → 0 - 0.3V

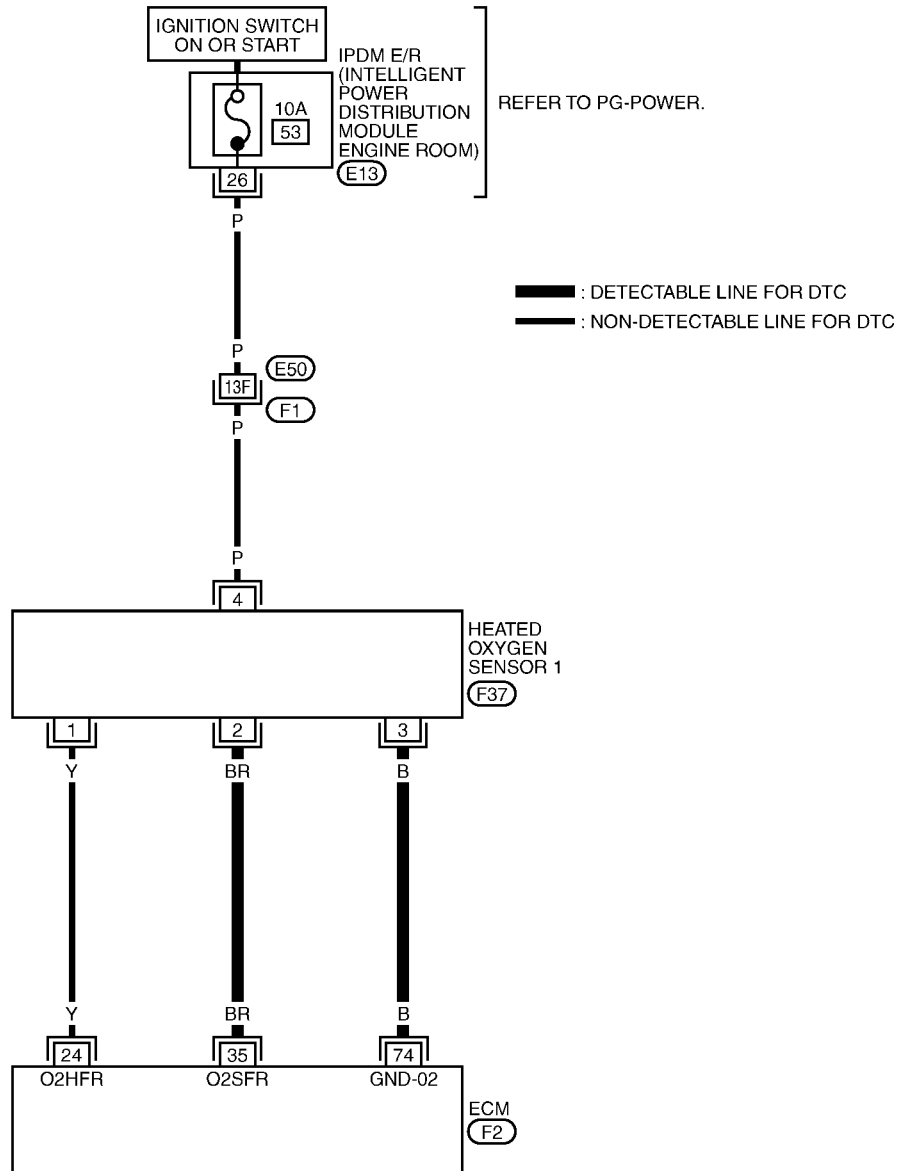
4. If NG, go to [EC-161, "Diagnostic Procedure"](#).



Wiring Diagram

EBS0005R

EC-HO2S1-01



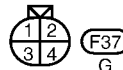
15	16	17	18	19
20	21	22	23	24
25	26			

(E13)
BR



4	5	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
3	3	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
1	2	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
		81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63

(F2)



REFER TO THE FOLLOWING.

(F1) -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

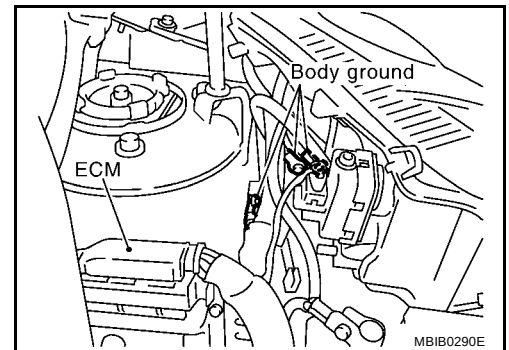
Diagnostic Procedure

EBS0005S

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

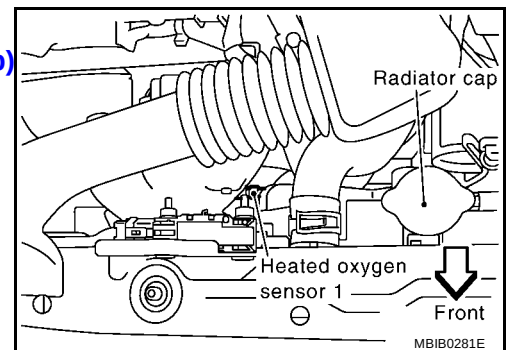


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

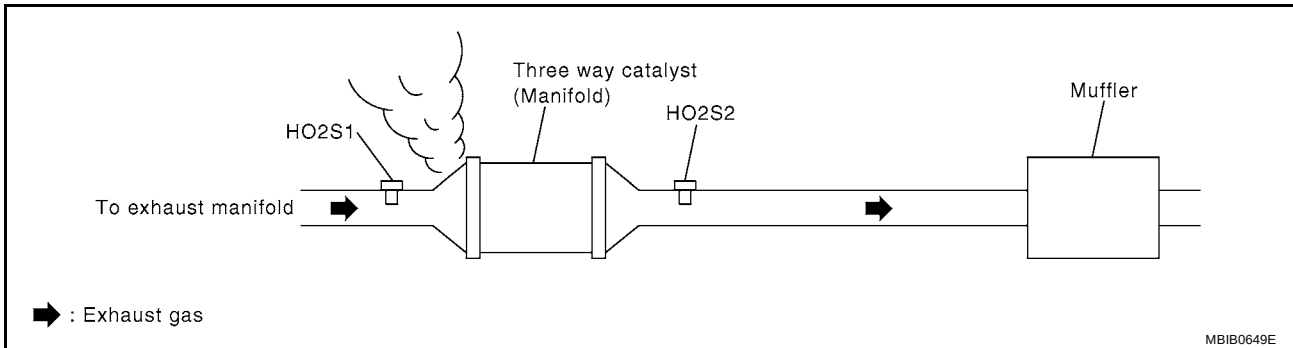
Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR 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 manifold absolute pressure sensor.

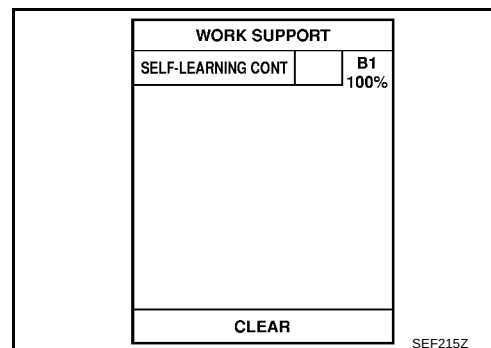
OK or NG

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

5. CLEAR THE SELF-LEARNING DATA

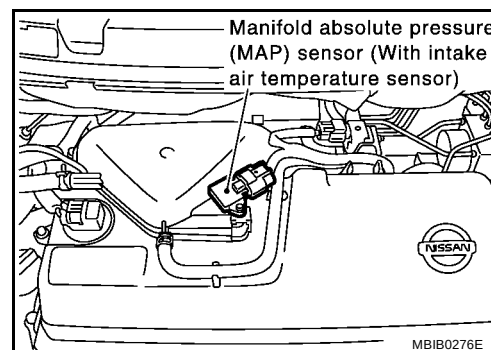
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
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 P0172 detected?
Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Make sure that DTC P0107 is displayed.
6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or DTC P0172 (Refer to [EC-188](#) or [EC-195](#)).
- No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

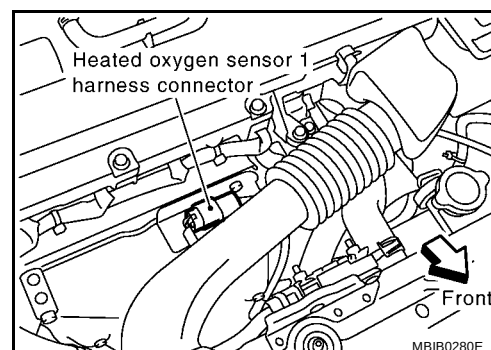
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness continuity between HO2S1 terminal 3 and engine ground. Refer to Wiring Diagram.

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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for 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 HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-130, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace malfunctioning heated oxygen sensor 1.

9. CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR

Refer to [EC-139, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> Replace manifold absolute pressure sensor.

10. CHECK PCV VALVE

Refer to [EC-409, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace PCV valve.

11. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-164, "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> Replace heated oxygen sensor 1.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS0005T

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.

3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

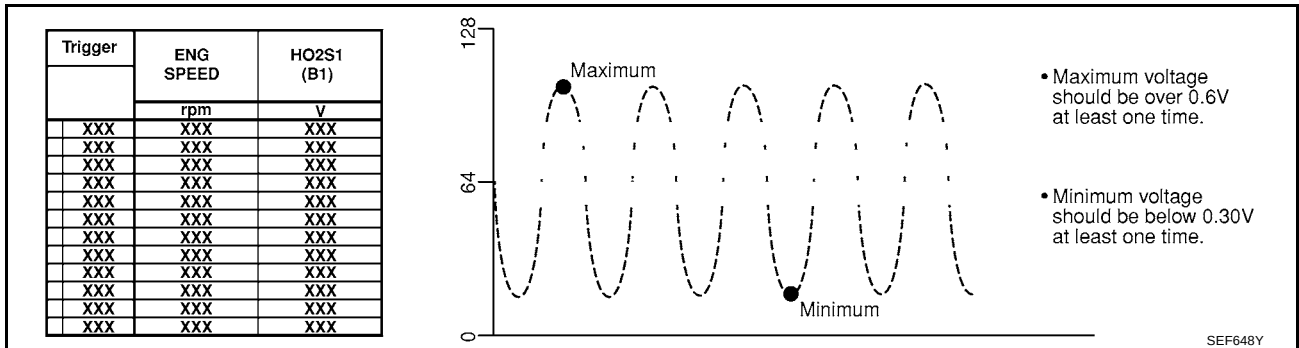
SEF646Y

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R	L	R	L	R	L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

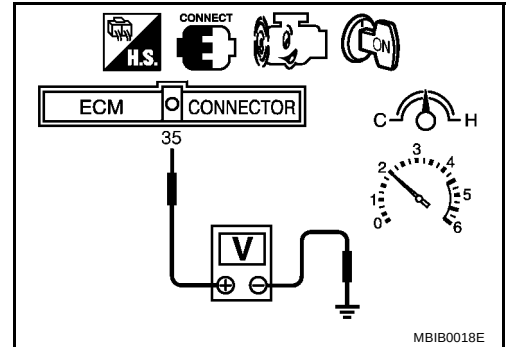
⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation

HEATED OXYGEN SENSOR 1

EBS0005U

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

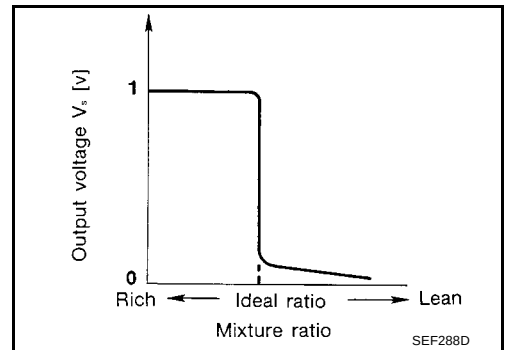
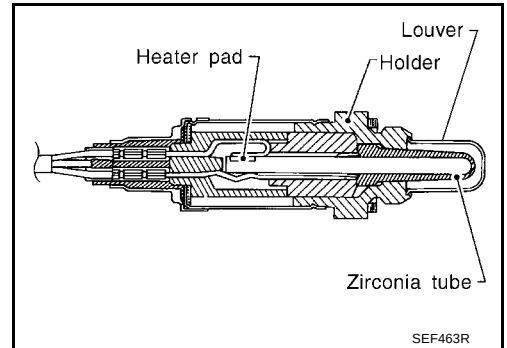
DTC P0134 HO2S1

PFP:22690

Component Description

EBS0005V

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

EBS0005W

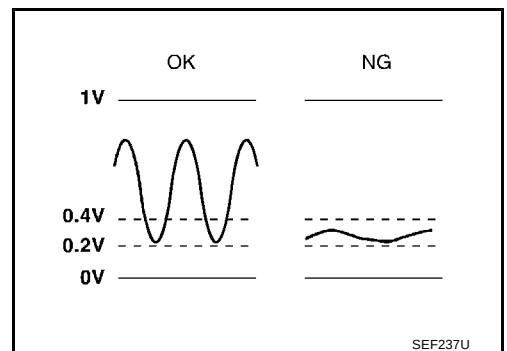
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS0005X

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

DTC Confirmation Procedure

EBS0005Y

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.

④ **WITH CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "HO2S1 (B1) P0134" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
3. Touch "START".
4. Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.

HO2S1 (B1) P0134	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0544E

5. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	2,150 - 4,250 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.9 - 7.2 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

6. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-171, "Diagnostic Procedure"](#).

HO2S1 (B1) P0134	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0545E

HO2S1 (B1) P0134	
COMPLETED	

SEC750C

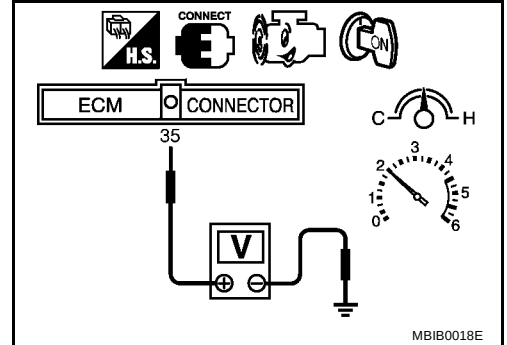
Overall Function Check

EBS0005Z

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

**WITH GST**

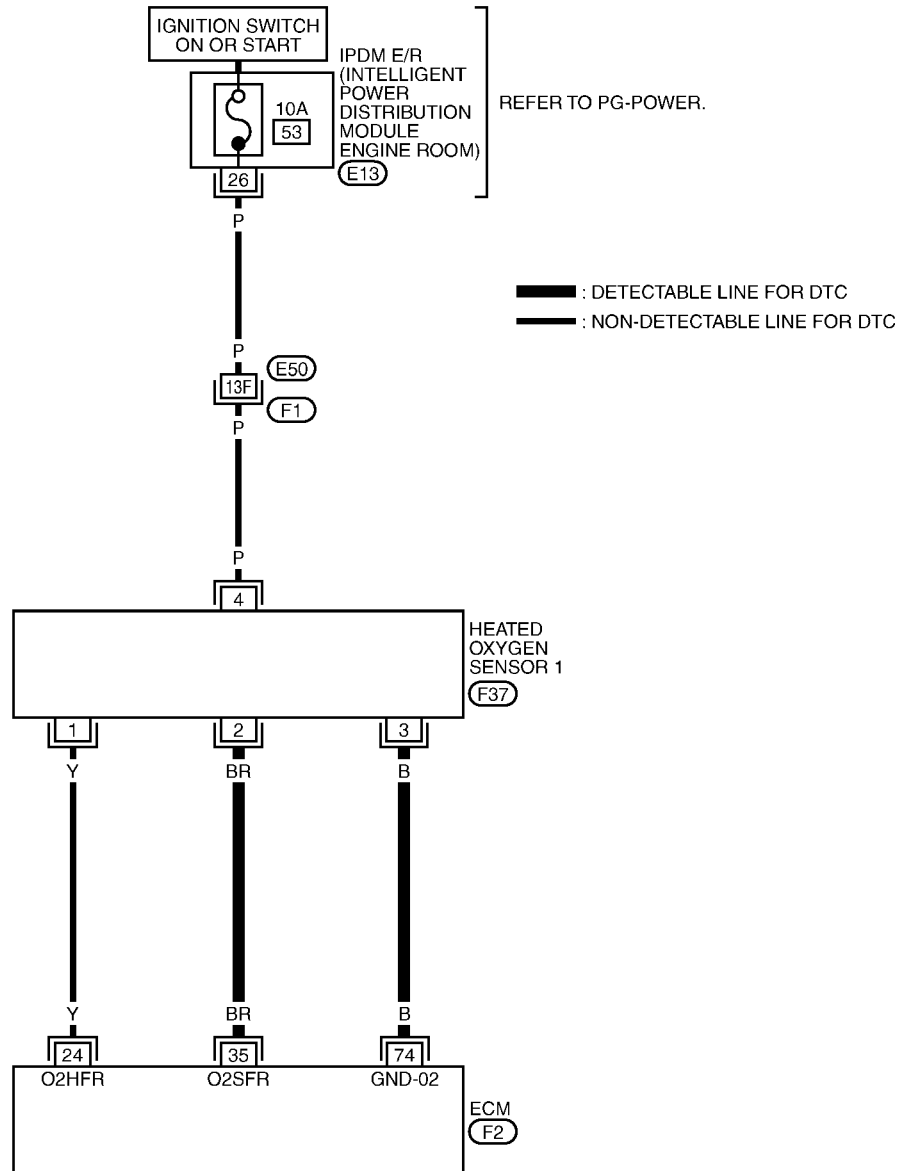
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 to 0.4V.
4. If NG, go to [EC-171, "Diagnostic Procedure"](#).



Wiring Diagram

EBS00060

EC-HO2S1-01

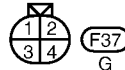


15	16	17	18	19
20	21	22	23	24
25	26			

(E13)
BR

4	5	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
3	3	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
1	2	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
		81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63

(F2)



REFER TO THE FOLLOWING.

(F1) -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

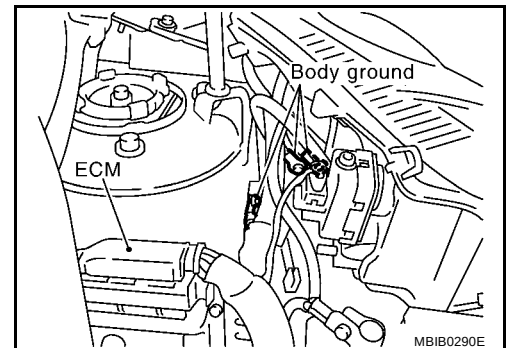
Diagnostic Procedure

EBS00061

1. INSPECTION START

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

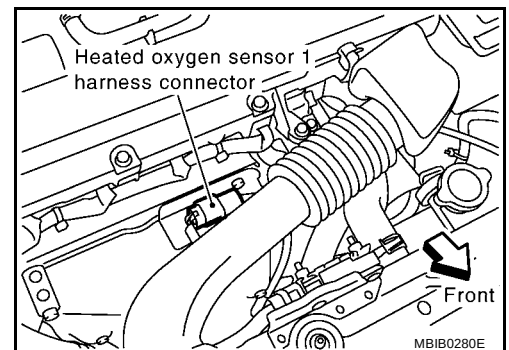
Continuity should exist.

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 power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

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 HEATED OXYGEN SENSOR 1

Refer to [EC-172, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS00062

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

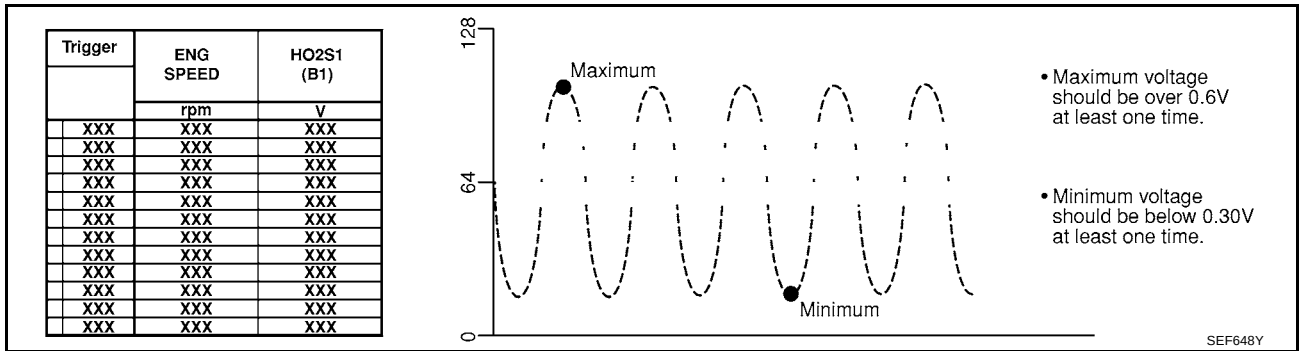
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R	L	R	L	R	L
R means HO2S1 MNTR (B1) indicates RICH						
L means HO2S1 MNTR (B1) indicates LEAN						

SEF217YA

**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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

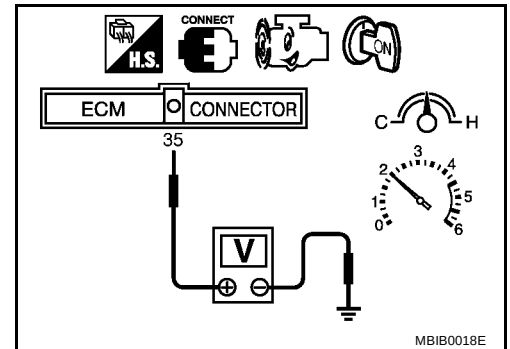
⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

**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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation

HEATED OXYGEN SENSOR 1

EBS00063

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#).

DTC P0138 HO2S2

PFP:226A0

Component Description

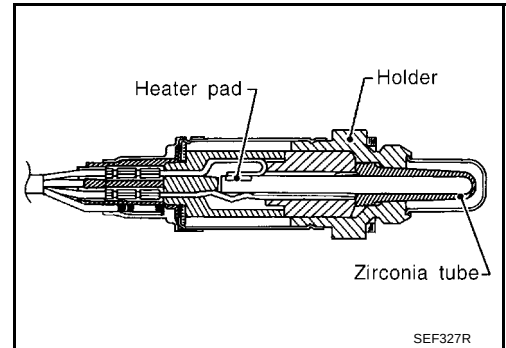
EBS00064

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the heated oxygen 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-II Reference Value in Data Monitor Mode**

EBS00065

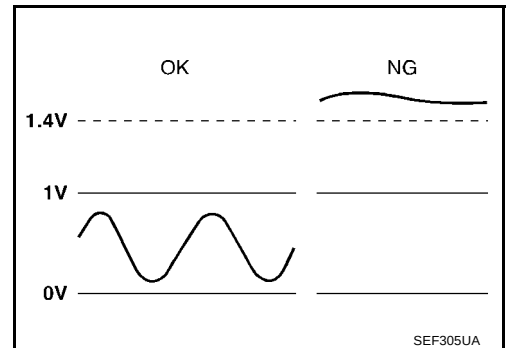
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		LEAN ↔ RICH

On Board Diagnosis Logic

EBS00066

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen 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 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	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

DTC Confirmation Procedure

EBS00067

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-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to [EC-177, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

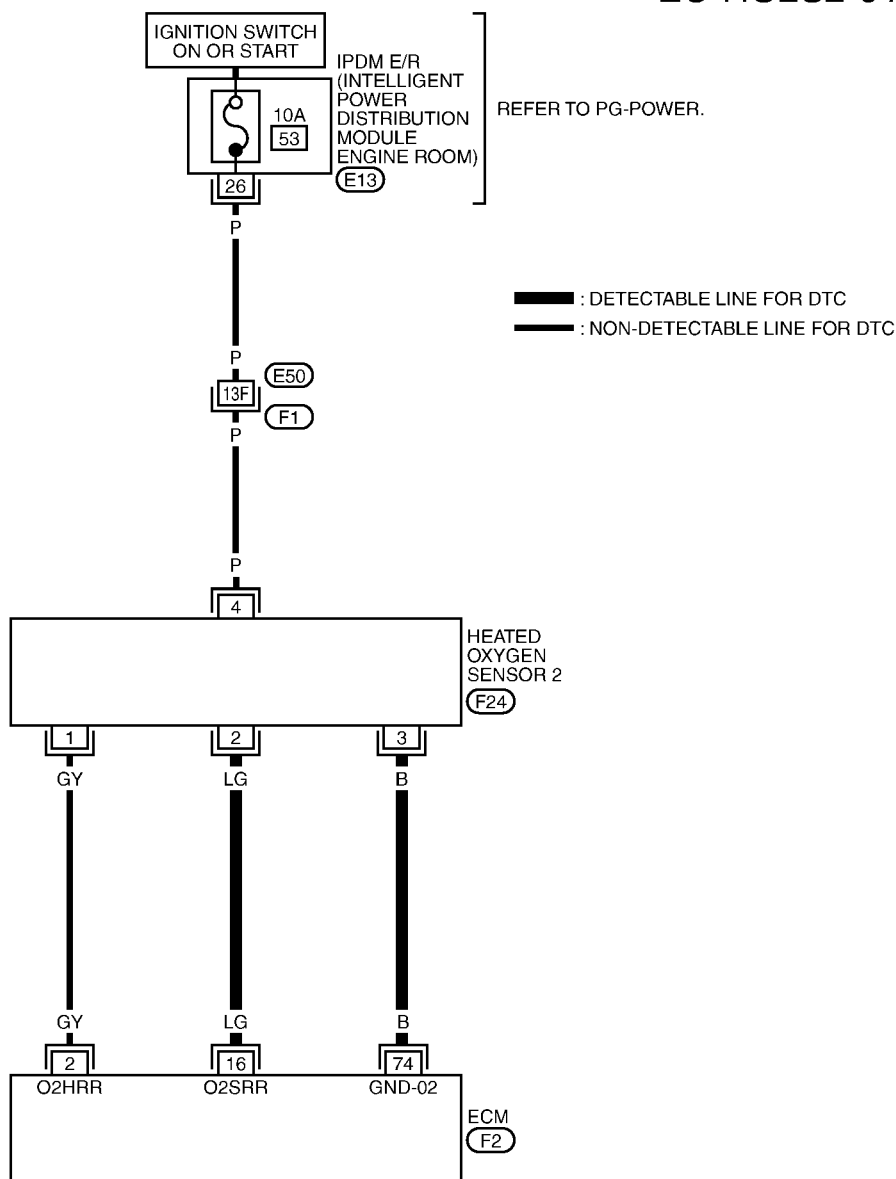
 WITH GST

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 one minute under no load.
 4. Let engine idle for two minutes.
 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 at least one minute under no load.
 7. Let engine idle for two minutes.
 8. Select "Mode3" with GST.
 9. If NG, go to [EC-177, "Diagnostic Procedure"](#).
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

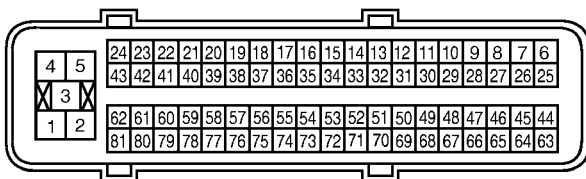
Wiring Diagram

EBS00069

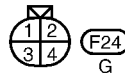
EC-HO2S2-01



15	16		17	18	19	
20	21	22	23	24	25	26

E13
BR

F2

F24
G

REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

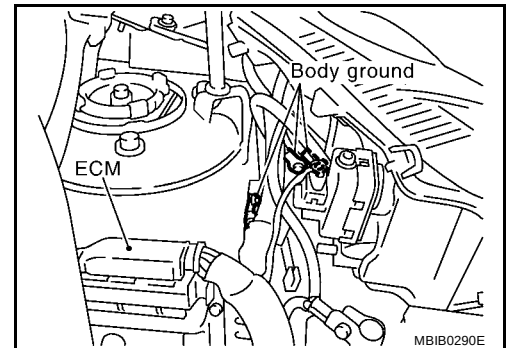
Diagnostic Procedure

EBS0006A

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

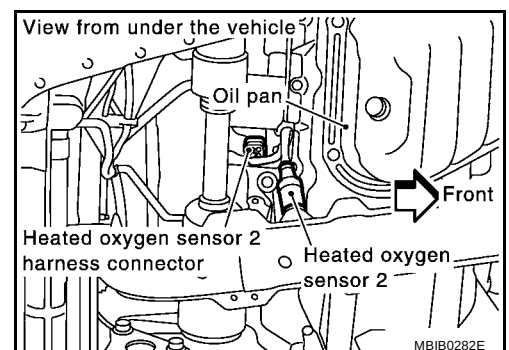
Continuity should exist.

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

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit 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 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

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 HEATED OXYGEN SENSOR 2

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

OK or NG

OK >> GO TO 5.

NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS0006B

④ With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

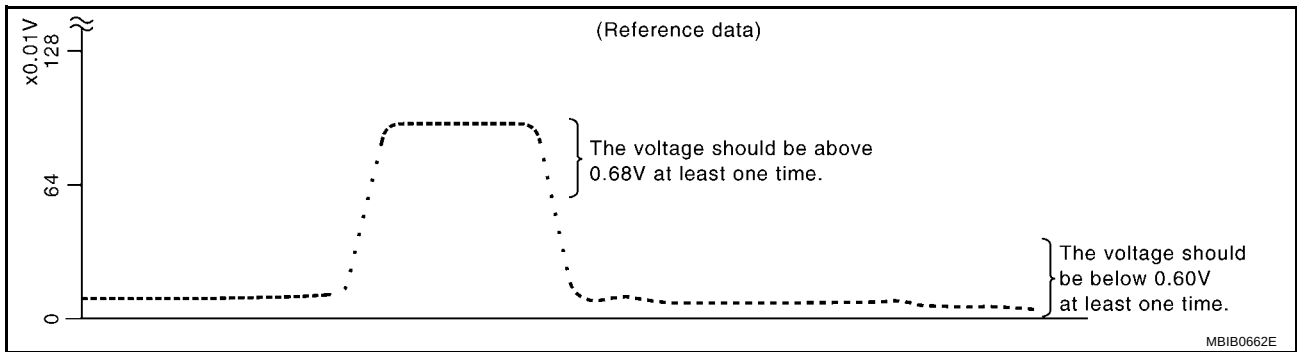
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2(B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

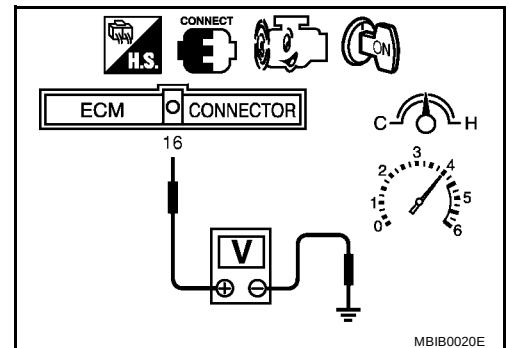
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Removal and Installation
HEATED OXYGEN SENSOR 2**

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

EBS0006C

DTC P0139 HO2S2

PFP:226A0

Component Description

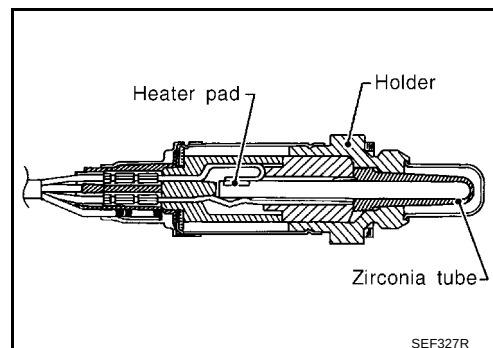
EBS0006D

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the heated oxygen 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-II Reference Value in Data Monitor Mode**

EBS0006E

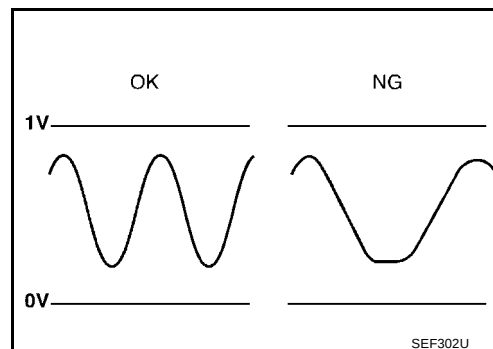
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		LEAN $\longleftrightarrow$ RICH

On Board Diagnosis Logic

EBS0006F

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen 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	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 ● Injectors ● Intake air leaks

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT-II 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-II**Procedure for COND1**

For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°(32 to 86°F).

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 one minute under no load.
4. Let engine idle one minute.
5. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
If “COMPLETED” appears on CONSULT-II screen, go to step 2 in “Procedure for COND3”.
If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-II 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
COOLANT TEMP/S	70 - 105 °C (158 - 221°F)
Selector level	Suitable position

HO2S2 (B1) P0139	HO2S2 (B1) P0139	HO2S2 (B1) P0139
COND1: OUT OF CONDITION	COND1: TESTING	COND1: COMPLETED
COND2: INCOMPLETE	COND2: INCOMPLETE	COND2: INCOMPLETE
COND3: INCOMPLETE	COND3: INCOMPLETE	COND3: INCOMPLETE
MONITOR	MONITOR	MONITOR
ENG SPEED XXX rpm B/FUEL SCHDL XXX msec	ENG SPEED XXX rpm B/FUEL SCHDL XXX msec	ENG SPEED XXX rpm B/FUEL SCHDL XXX msec

PBIB0552E

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-II 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 from the above condition [step 9] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:

If "COMPLETED" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

HO2S2 (B1) P0139	
COND1:	COMPLETED
COND2:	COMPLETED
COND3:	INCOMPLETE
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

PBIB0553E

Procedure for COND3

1. Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II 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-184, "Diagnostic 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 "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
 - c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
 - d. When "COOLANTEMP/S" indication reaches to 70°(158°F), go to procedure for COND1 step 3.

HO2S2 (B1) P0139	
COMPLETED	
SELF-DIAG RESULTS	

SEF668Y

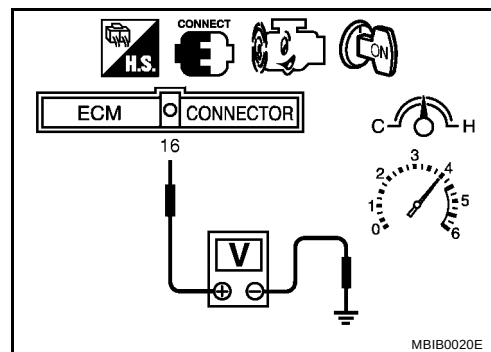
Overall Function Check

EBS0006H

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

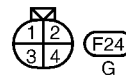
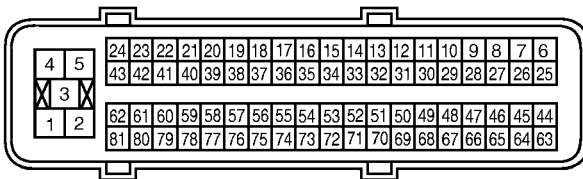
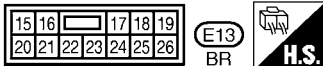
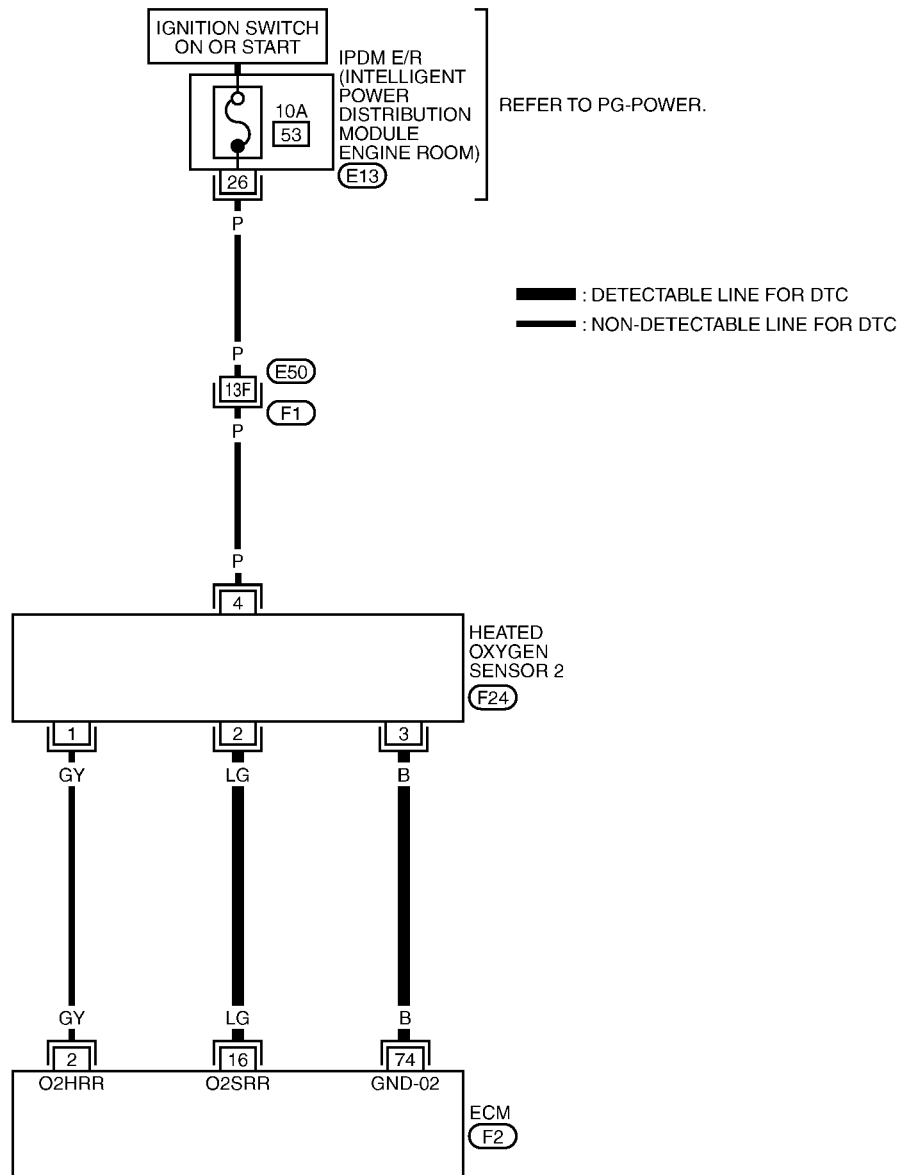
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 change at 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 (A/T), 3rd gear position (M/T).
The voltage should change at more than 0.06V for 1 second during this procedure.
8. If NG, go to [EC-184, "Diagnostic Procedure"](#).



Wiring Diagram

EBS0006I

EC-HO2S2-01



REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

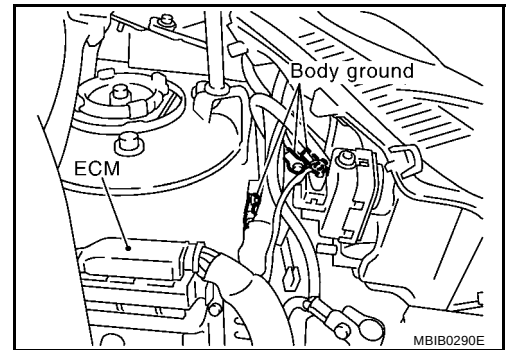
Diagnostic Procedure

EBS0006J

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

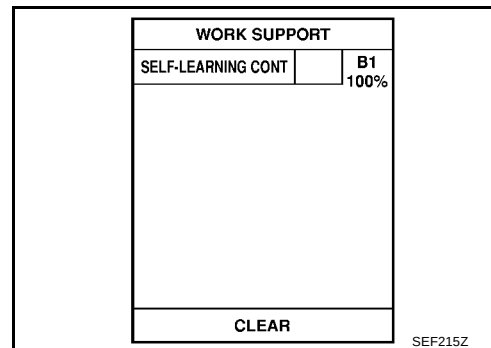
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

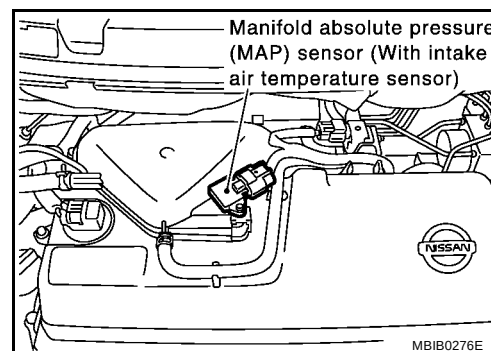
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
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 P0172 detected?
Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Make sure that DTC P0107 is displayed.
6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to [EC-188](#) or [EC-195](#).
- No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

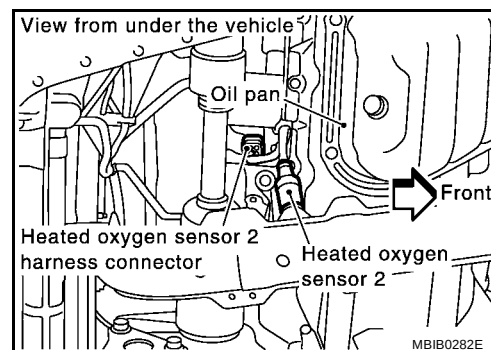
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

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 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. 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-186, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS0006K

With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

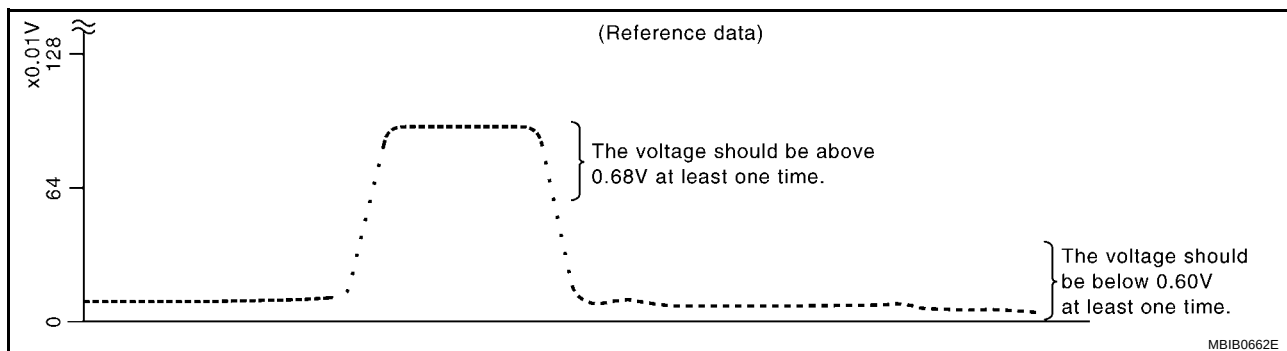
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

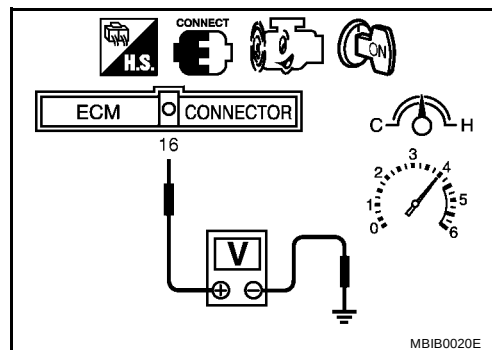
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

EBS0006L

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBDD)]

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

EBS0006M

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 heated oxygen 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 light up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	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 - Heated oxygen sensor 1 - Injectors - Exhaust gas leaks - Incorrect fuel pressure - Lack of fuel - Manifold absolute pressure sensor - Incorrect PCV hose connection

DTC Confirmation Procedure

EBS0006N

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-II

- 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-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to [EC-191, "Diagnostic Procedure"](#).
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- Crank engine while depressing accelerator pedal. If engine starts, go to [EC-191, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

WORK SUPPORT		
SELF-LEARNING CONT		B1 100%
CLEAR		

SEF215Z

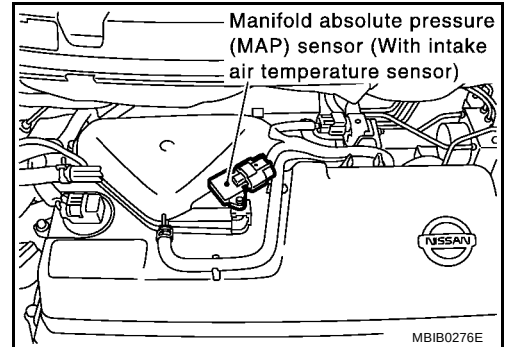
DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]



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 manifold absolute pressure sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Select "MODE 3" with GST. Make sure DTC P0107 is detected.
6. Select "MODE 4" with GST and erase the DTC P0107.
7. Start engine again and let it idle for at least 10 minutes.
8. Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to [EC-191, "Diagnostic Procedure"](#).
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-191, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.



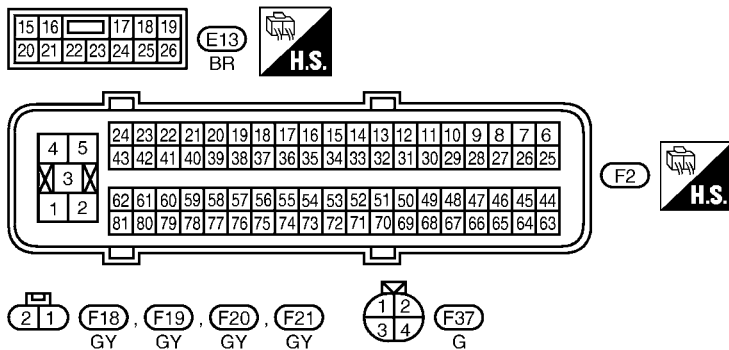
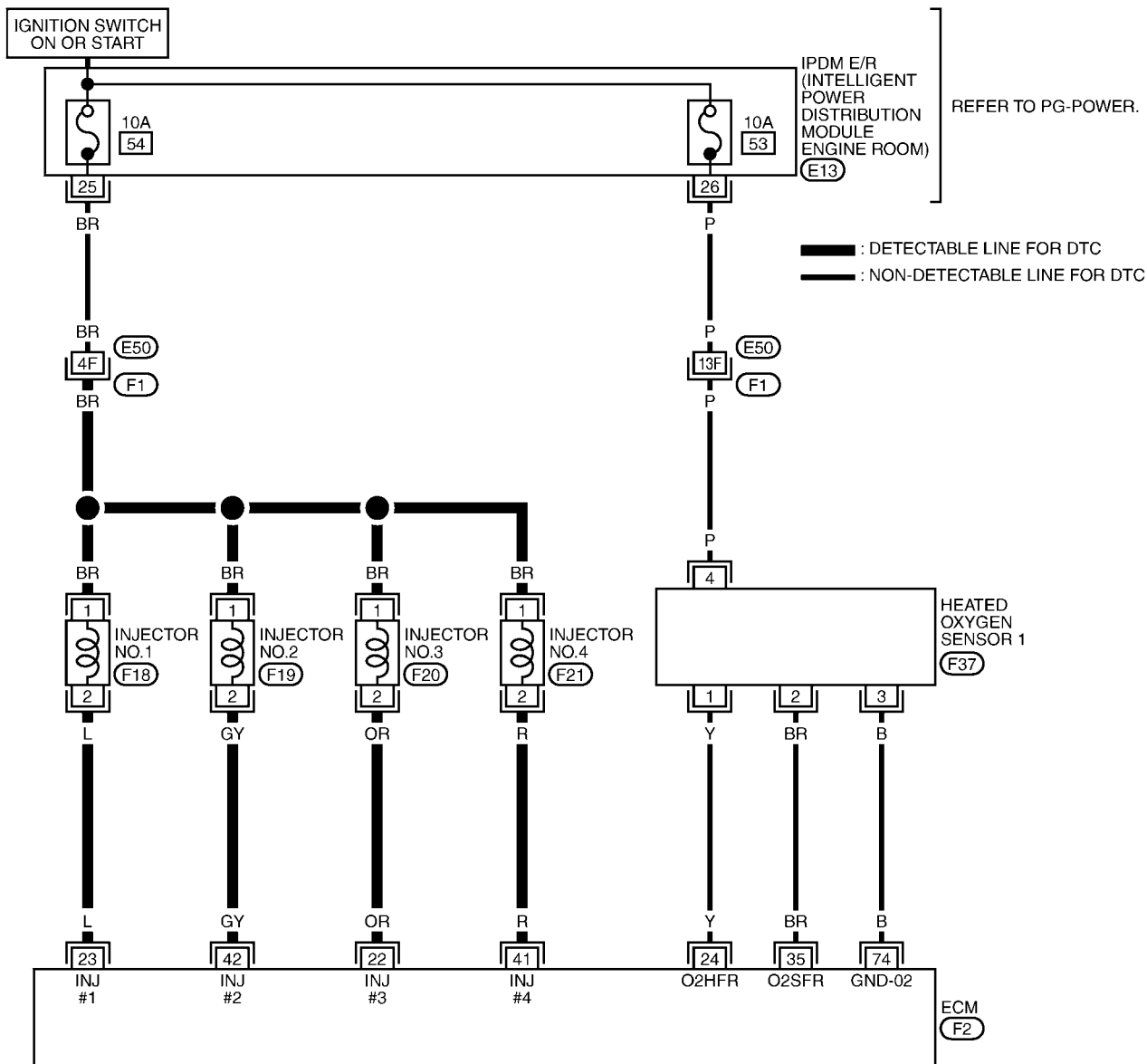
DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS00060

EC-FUEL-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0274E

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

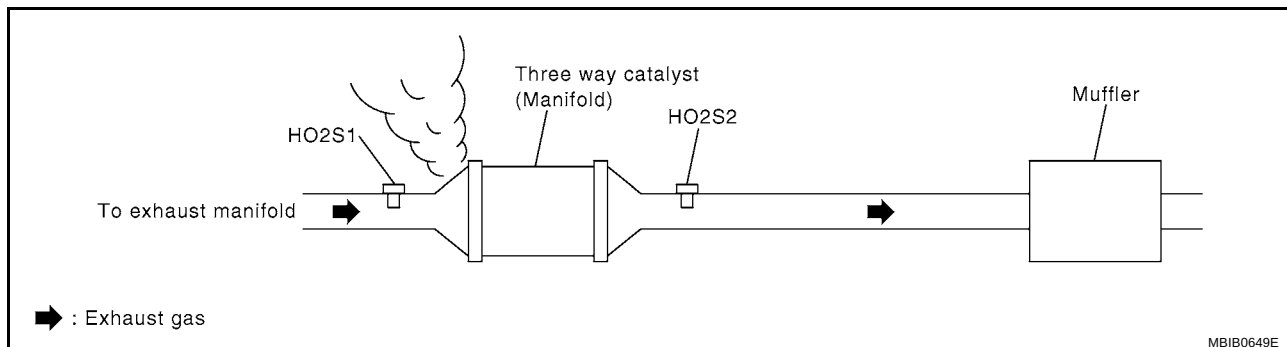
[CR (WITH EURO-OBD)]

Diagnostic Procedure

EBS0006P

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 AND PCV HOSE

1. Listen for an intake air leak after the manifold absolute pressure sensor.
2. Check PCV hose connection.

OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace.

3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

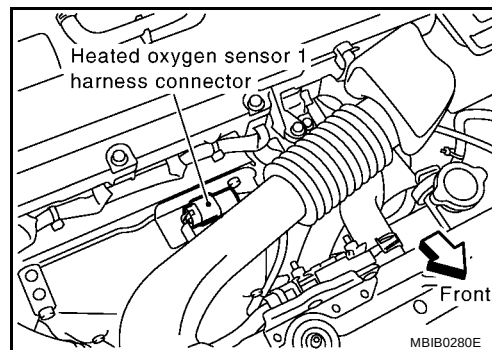
5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

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-36, "FUEL PRESSURE RELEASE"](#) .
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-37, "FUEL PRESSURE CHECK"](#) .

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

OK or NG

- OK >> GO TO 5.
NG >> Follow the construction of "FUEL PRESSURE CHECK" ([EC-36](#)).

5. CHECK MANIFOLD ABSOLUTE PRESSUR SENSOR

 With CONSULT-II

1. Install all removed parts.
2. Check manifold absolute pressure sensor signal with CONSULT-II.

**Approximately at idling
1.5V:**

**Approximately at 2,500 rpm
1.2V:**

 With GST

1. Install all removed parts.
2. Check manifold absolute pressure sensor signal in MODE 1 with GST.

**Approximately at idling
1.5V:**

**Approximately at 2,500 rpm
1.2V:**

OK or NG

- OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the manifold absolute pressure sensor circuit or engine grounds. Refer to [EC-136, "DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR"](#) .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

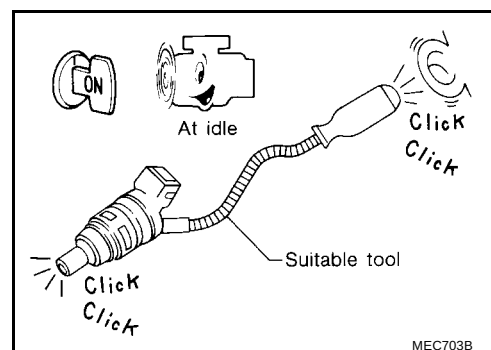
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



MEC703B

OK or NG

OK >> GO TO 7.

NG >> Perform trouble diagnosis for "INJECTORS", [EC-385, "INJECTOR CIRCUIT"](#).

7. CHECK INJECTOR

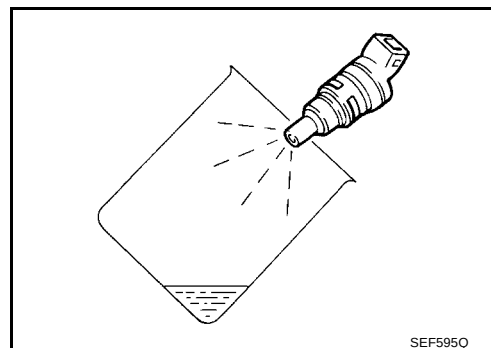
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Disconnect injector harness connectors.
4. Remove injector gallery assembly. Refer to [EM-28, "FUEL INJECTOR AND FUEL TUBE"](#). Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.

OK or NG

OK >> GO TO 8.

NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.



SEF595Q

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

EBS0006Q

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 heated oxygen sensors 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 light up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	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.)	- Heated oxygen sensor 1 - Injectors - Exhaust gas leaks - Incorrect fuel pressure - Manifold absolute pressure sensor

DTC Confirmation Procedure

EBS0006R

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-II

- 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-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to [EC-198. "Diagnostic Procedure"](#).
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- Crank engine while depressing accelerator pedal.
If engine starts, go to [EC-198. "Diagnostic Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.

WORK SUPPORT	
SELF-LEARNING CONT	B1 100%
CLEAR	

SEF215Z

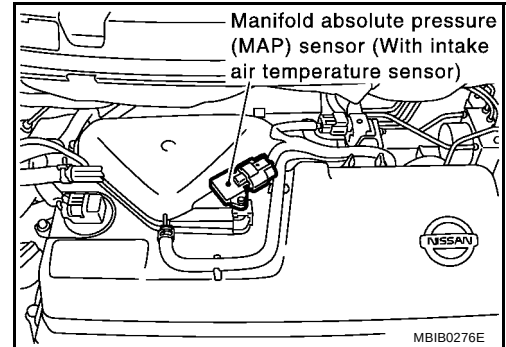
DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]



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 manifold absolute pressure sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Select "MODE 3" with GST. Make sure DTC P0107 is detected.
6. Select "MODE 4" with GST and erase the DTC P0107.
7. Start engine again and let it idle for at least 10 minutes.
8. Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to [EC-198, "Diagnostic Procedure"](#).
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-198, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.



[CR (WITH EURO-OBD)]

EBS0006S

A

C

D

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F

G

H

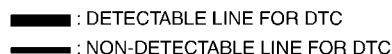
1

J

K

1

M



(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

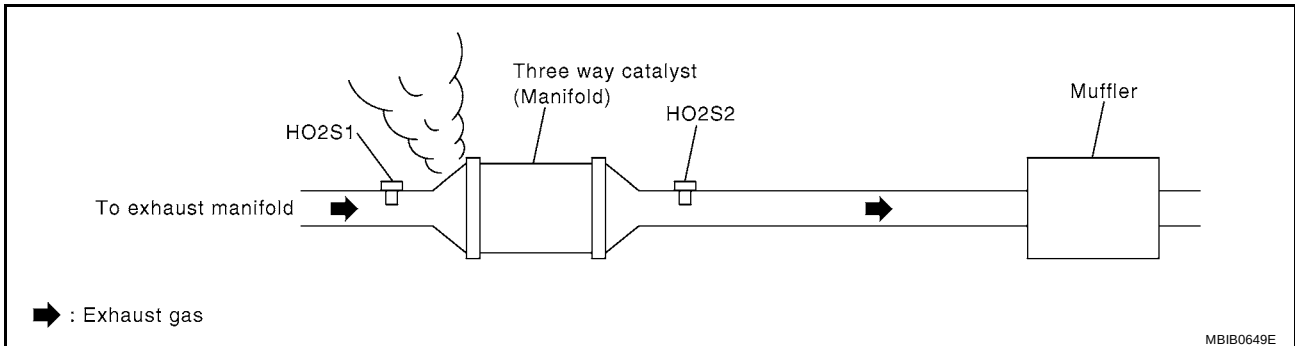
[CR (WITH EURO-OBD)]

EBS0006T

Diagnostic Procedure

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

Listen for an intake air leak after the manifold absolute pressure sensor.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

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.

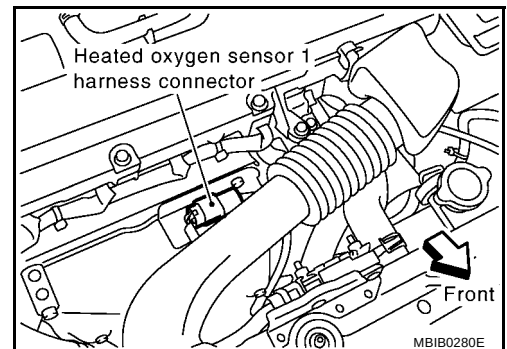
4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC-36, "FUEL PRESSURE RELEASE"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-37, "FUEL PRESSURE CHECK"](#).

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

OK or NG

- OK >> GO TO 5.
NG >> Follow the construction of "FUEL PRESSURE CHECK".



5. CHECK MANIFOLD ABSOLUTE PRESSUR SENSOR

 With CONSULT-II

1. Install all removed parts.
2. Check manifold absolute pressure sensor signal with CONSULT-II.

Approximately at idling
1.5V:

Approximately at 2,500 rpm
1.2V:

 With GST

1. Install all removed parts.
2. Check manifold absolute pressure sensor signal in MODE 1 with GST.

Approximately at idling
1.5V:

Approximately at 2,500 rpm
1.2V:

OK or NG

OK >> GO TO 6.

NG >> Check connectors for rusted terminals or loose connections in the manifold absolute pressure sensor circuit or engine grounds. Refer to [EC-136, "DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR"](#) .

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[CR (WITH EURO-OBD)]

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

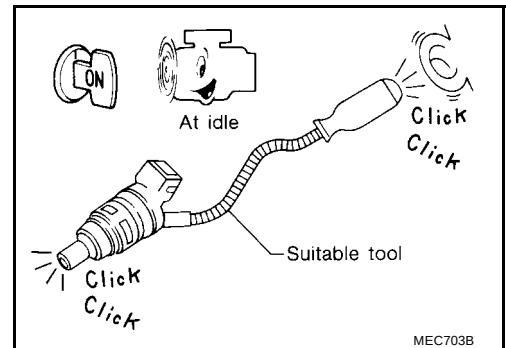
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> GO TO 7.

NG >> Perform trouble diagnosis for "INJECTORS", [EC-385, "INJECTOR CIRCUIT"](#) .

7. CHECK INJECTOR

1. Remove injector assembly. Refer to [EM-28, "FUEL INJECTOR AND FUEL TUBE"](#) .
Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors.
The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.

NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P0221 TP SENSOR

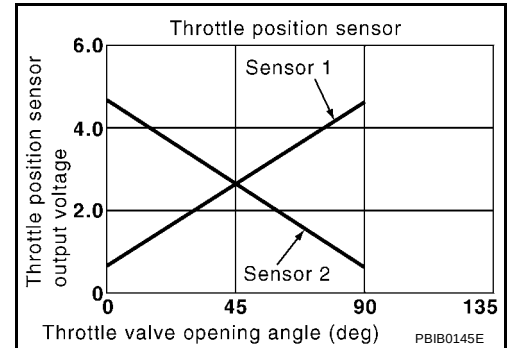
PFP:161119

Component Description

EBS0006U

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-II Reference Value in Data Monitor Mode

EBS0006V

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T model) 1st (M/T model)	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

EBS0006W

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0221 0221	Throttle position sensor circuit range/performance problem	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.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

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

EBS0006X

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.

[CR (WITH EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-204, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

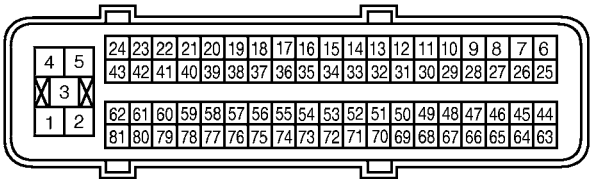
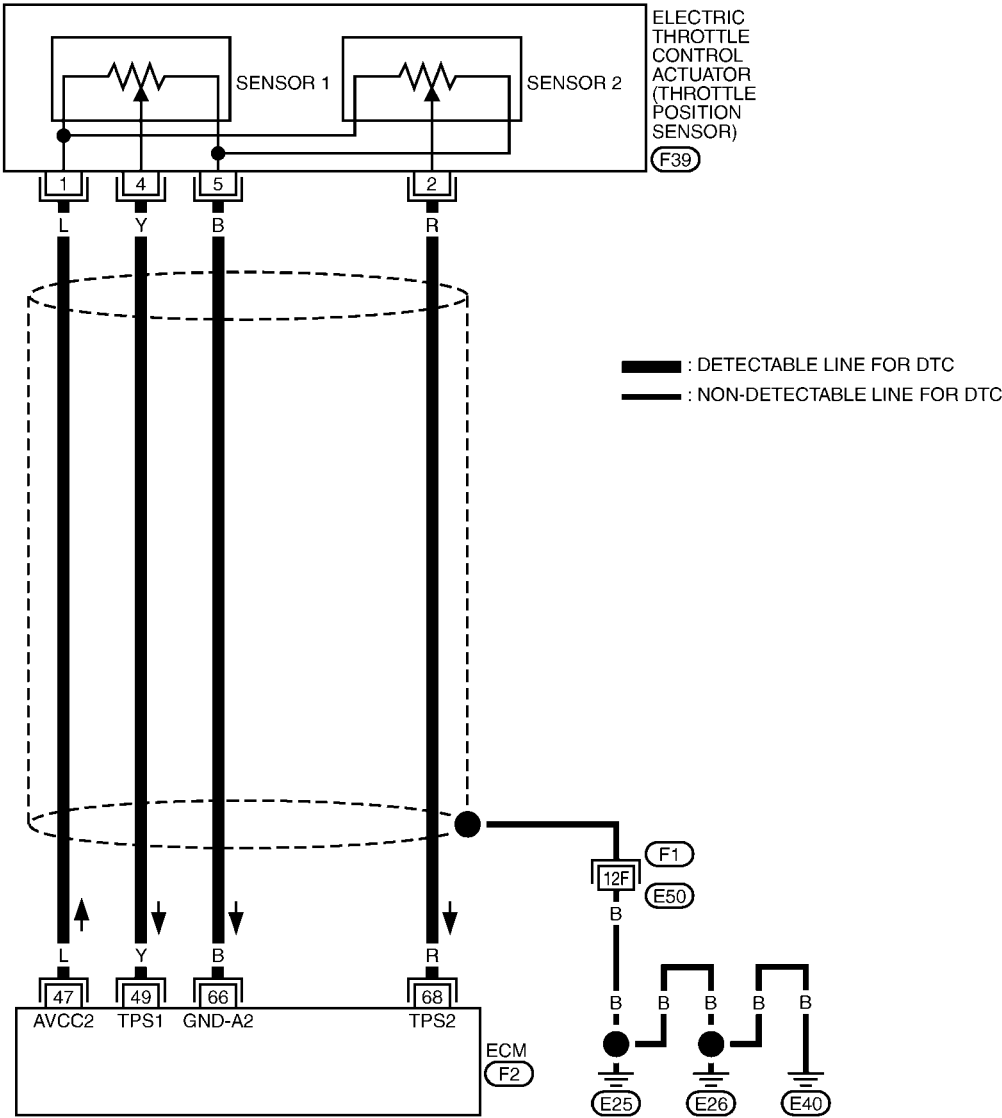
SEF058Y

Follow the procedure "WITH CONSULT-II" above.

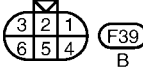
Wiring Diagram

EBS0006Y

EC-TPS3-01



F2



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0221 TP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

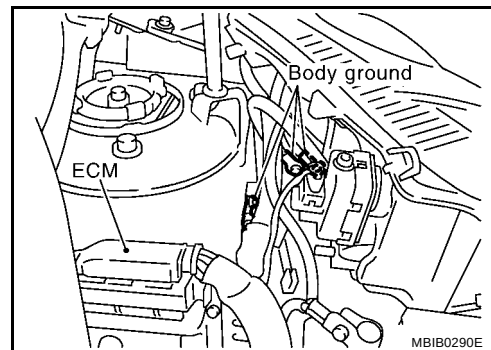
Diagnostic Procedure

EBS0006Z

1. RETIGHTEN GROUND SCREWS

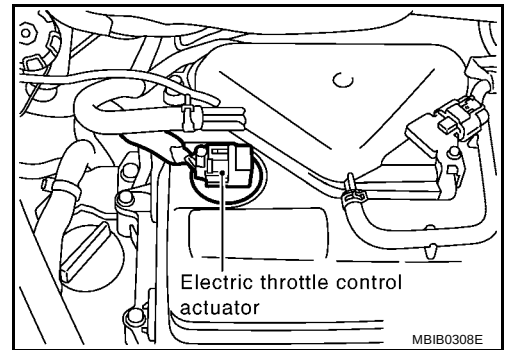
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

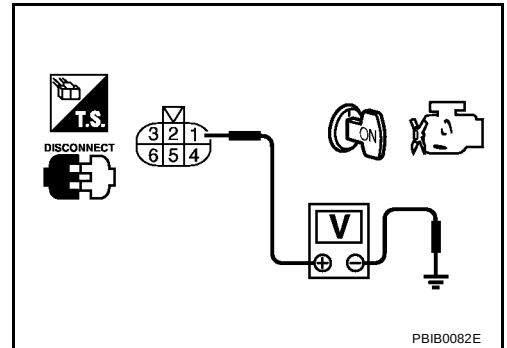


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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.



3. 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4, ECM terminal 68 and electric throttle control actuator terminal 2. 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 THROTTLE POSITION SENSOR

Refer to [EC-206, "Component Inspection"](#).

OK or NG

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

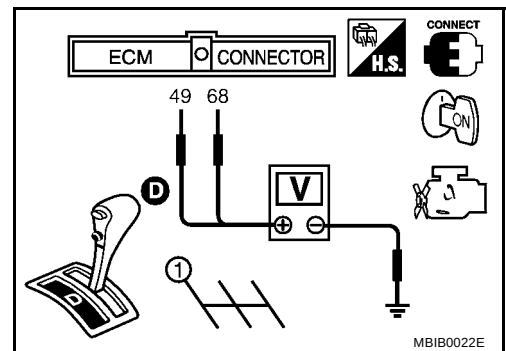
Component Inspection THROTTLE POSITION SENSOR

EBS00070

1. Reconnect all harness connectors disconnected.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (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-34, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-34, "Idle Air Volume Learning"](#) .



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS00071

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P0222, P0223 TP SENSOR

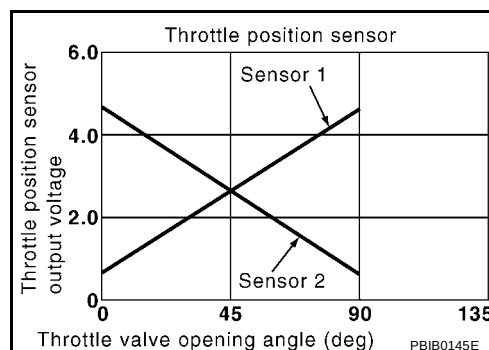
PFP:16119

Component Description

EBS00072

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-II Reference Value in Data Monitor Mode

EBS00073

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	Shift lever: D (A/T model) 1st (M/T model)	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

EBS00074

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.)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

FAIL-SAFE MODE

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

EBS00075

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.

[CR (WITH EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-210, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Follow the procedure "WITH CONSULT-II" above.

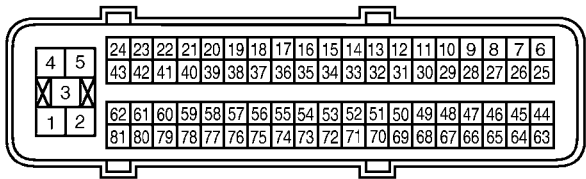
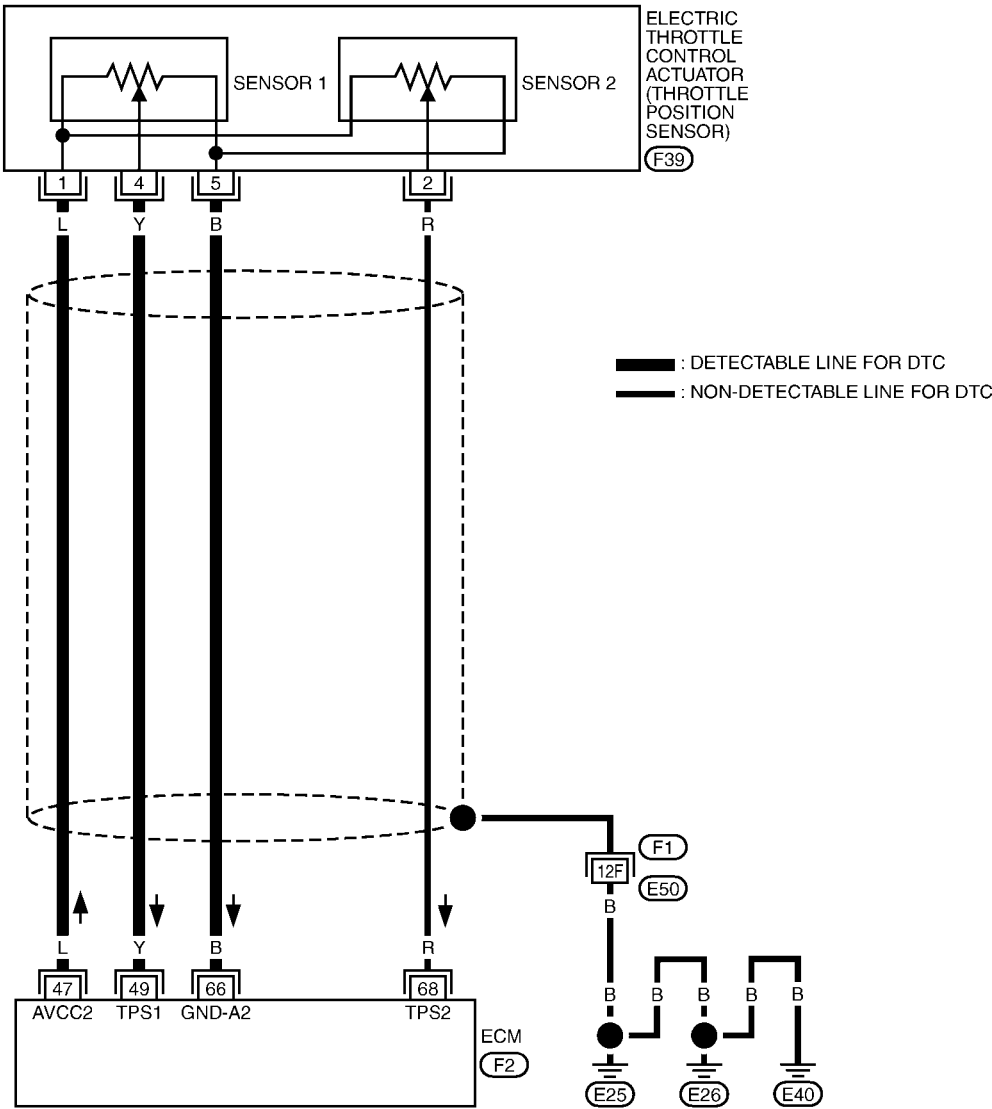
DTC P0222, P0223 TP SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS00076

EC-TPS1-01



F2



F39 B

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0222, P0223 TP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

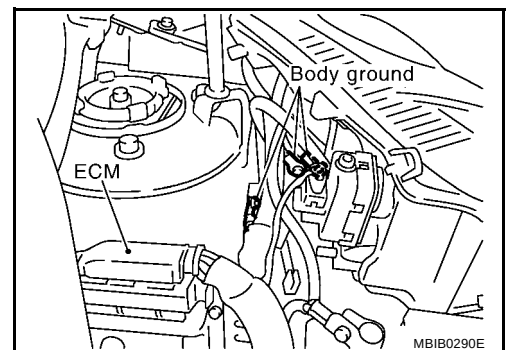
Diagnostic Procedure

EBS00077

1. RETIGHTEN GROUND SCREWS

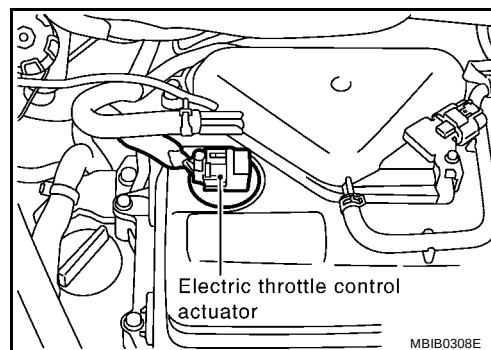
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

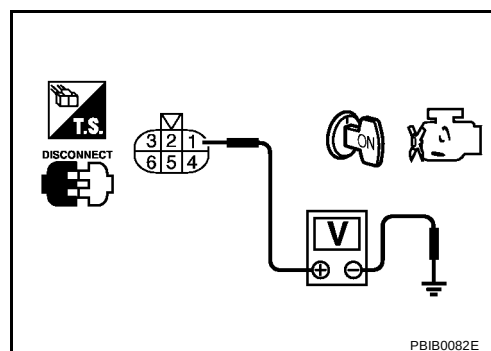


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4. 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 THROTTLE POSITION SENSOR

Refer to [EC-212, "Component Inspection"](#).

OK or NG

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

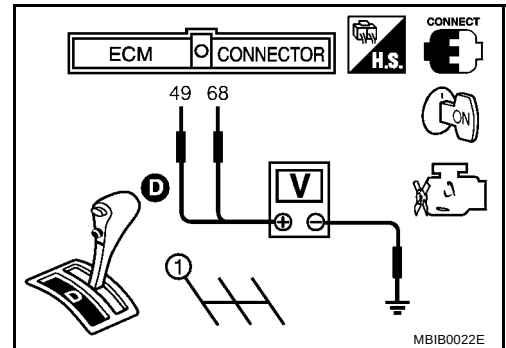
Component Inspection THROTTLE POSITION SENSOR

EBS00078

1. Reconnect all harness connectors disconnected.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (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-34, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-34, "Idle Air Volume Learning"](#) .



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS00079

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P0226 APP SENSOR

PFP:18002

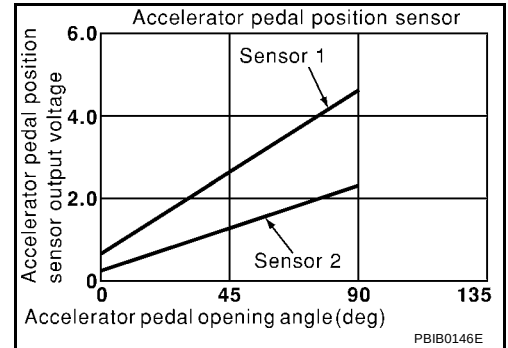
Component Description

EBS0007A

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-II Reference Value in Data Monitor Mode**

EBS0007B

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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

EBS0007C

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0226 0226	Accelerator pedal position sensor circuit range/performance problem	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.) ● Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

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

EBS0007D

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.

[CR (WITH EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-218, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Follow the procedure "WITH CONSULT-II" above.

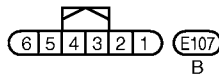
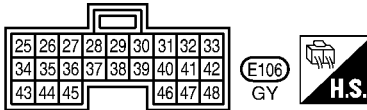
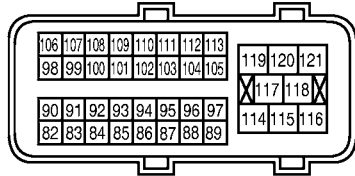
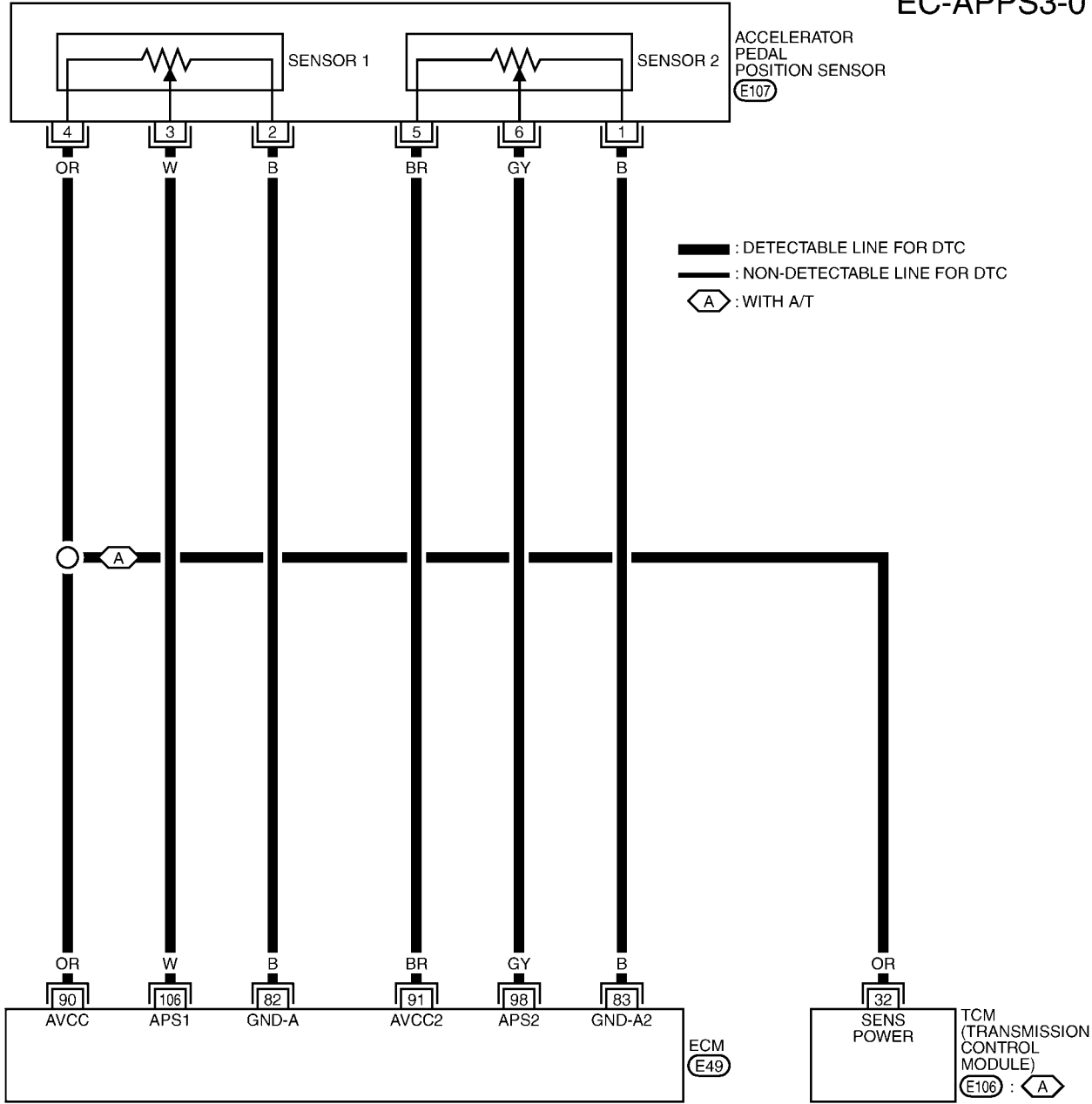
DTC P0226 APP SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram
LHD MODELS

EBS0007E

EC-APPS3-01



DTC P0226 APP SENSOR

[CR (WITH EURO-OBD)]

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

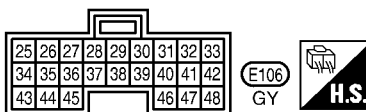
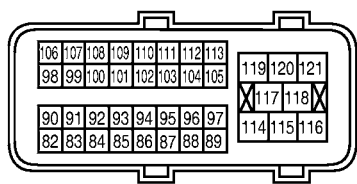
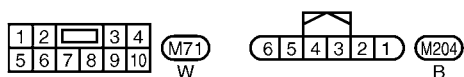
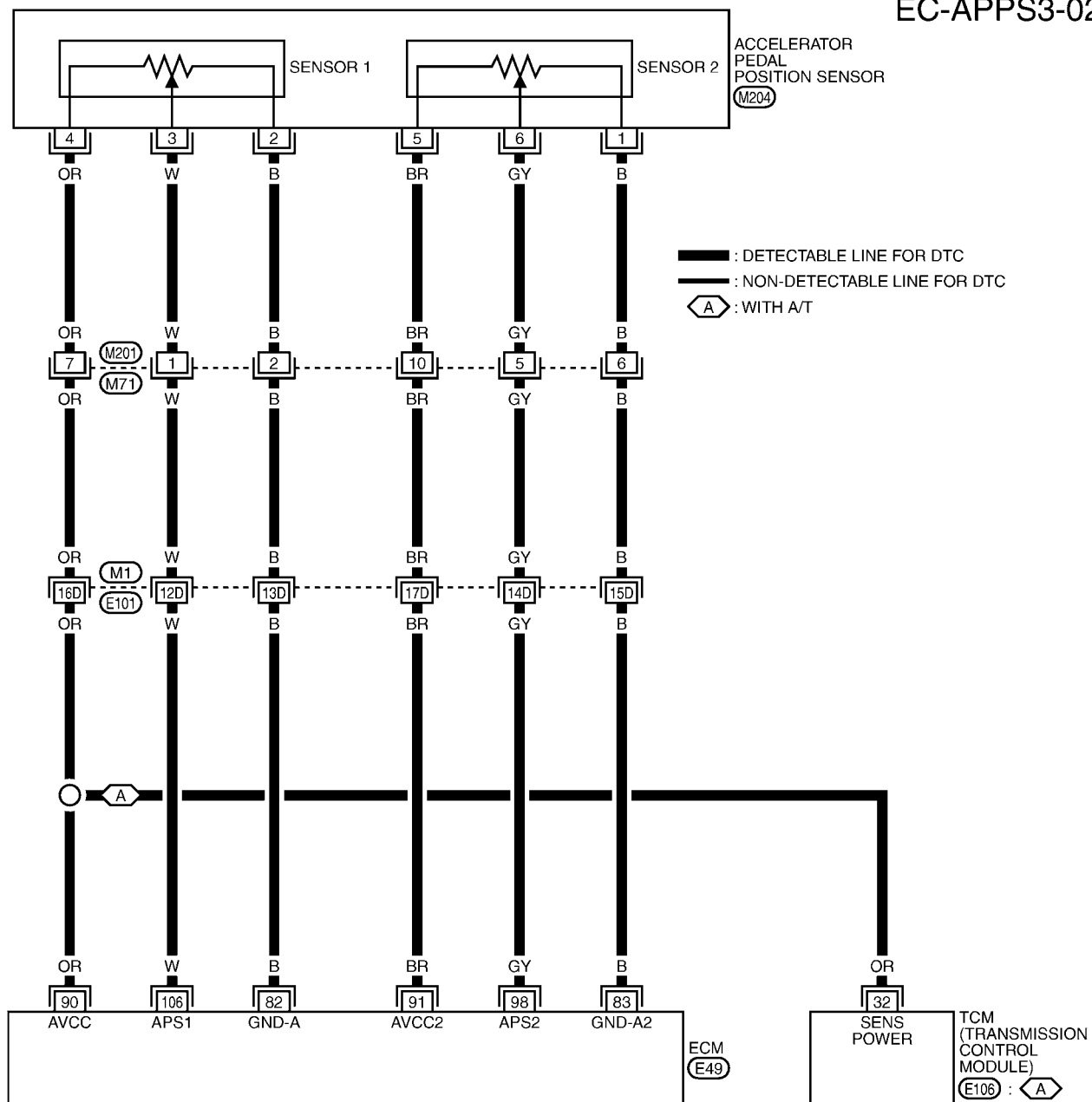
CAUTION:

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

[CR (WITH EURO-OBD)]

EC-APPS3-02



**(M1) -SUPER MULTIPLE
JUNCTION (SMJ)**

DTC P0226 APP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

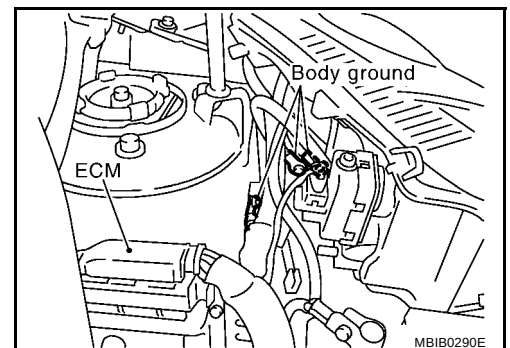
Diagnostic Procedure

EBS0007F

1. RETIGHTEN GROUND SCREWS

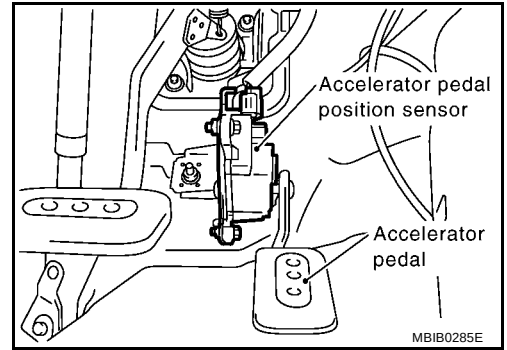
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

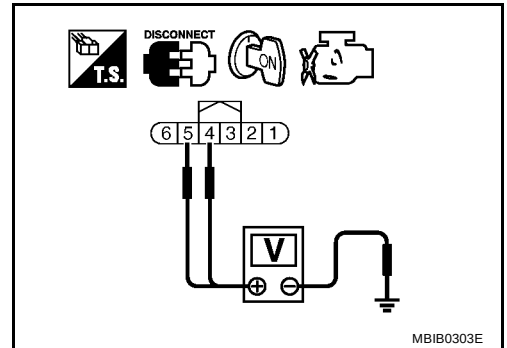


3. Check voltage between APP sensor terminals 4, 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 2, ECM terminal 83 and APP sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor
- Harness for open or short between TCM and accelerator pedal position sensor

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

6. 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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-221, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

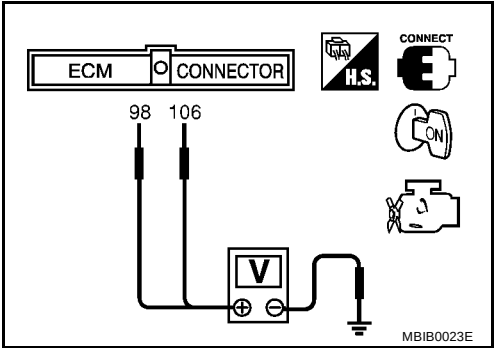
>> **INSPECTION END**

Component Inspection

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 engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-34, "Idle Air Volume Learning"](#) .

Remove and Installation

ACCELERATOR PEDAL

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

DTC P0227, P0228 APP SENSOR

PFP:18002

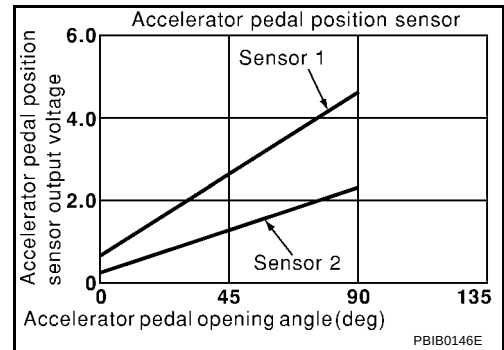
Component Description

EBS0007I

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-II Reference Value in Data Monitor Mode**

EBS0007J

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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

EBS0007K

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	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)
P0228 0228	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, the ECM enters fail-safe mode and the MI 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

EBS0007L

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.

DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-227, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
SEF058Y	

WITH GST

Follow the procedure "WITH CONSULT-II" above.

A

EC

C

D

E

F

G

H

I

J

K

L

M

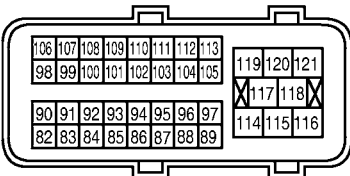
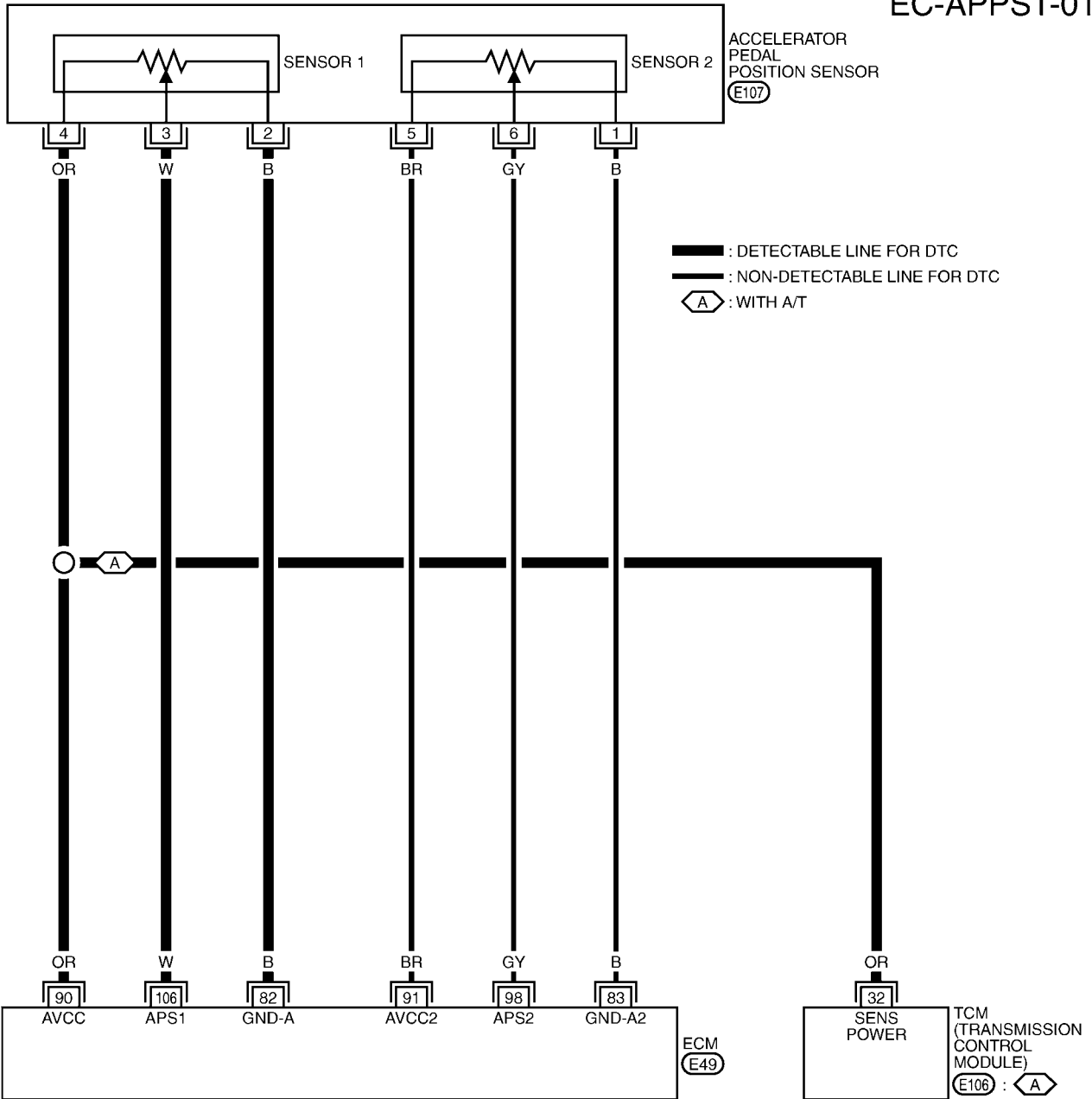
DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

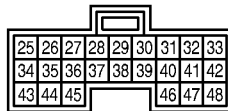
EBS00O7M

Wiring Diagram LHD MODELS

EC-APPS1-01

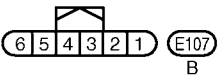


(E49)



(E106)

GY



MBWA0279E

DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

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.

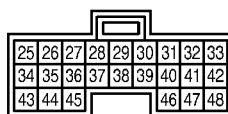
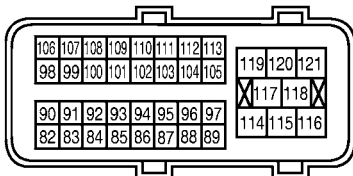
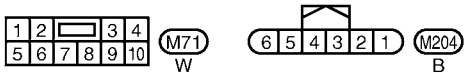
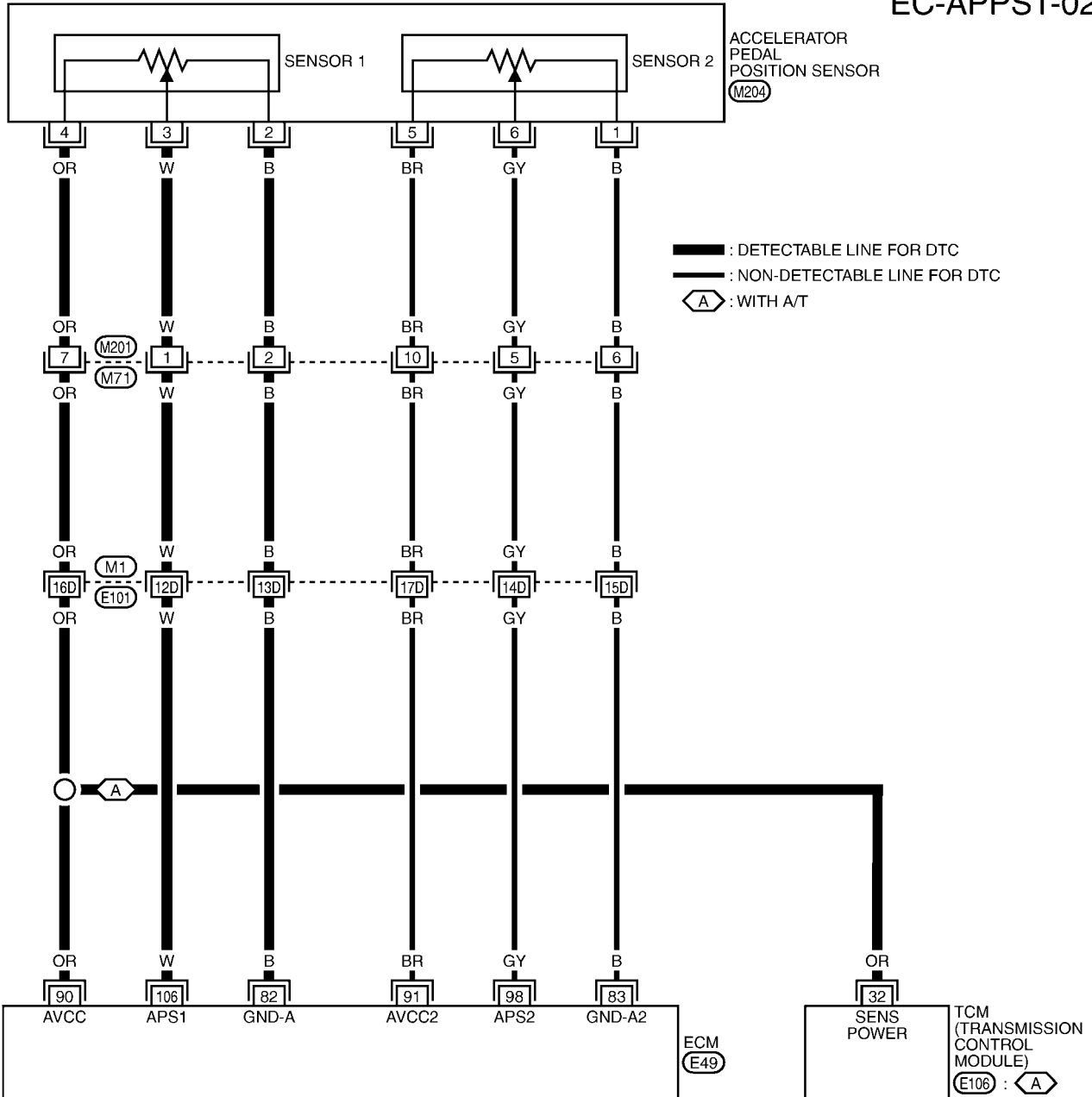
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

RHD MODELS

EC-APPS1-02



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

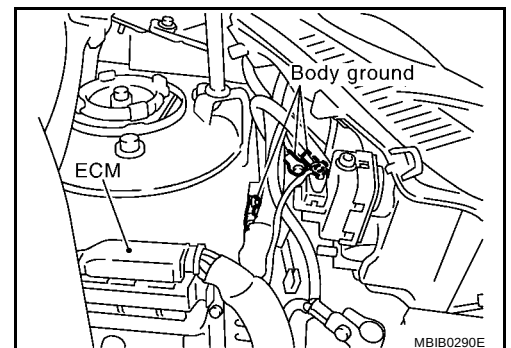
Diagnostic Procedure

EBS0007N

1. RETIGHTEN GROUND SCREWS

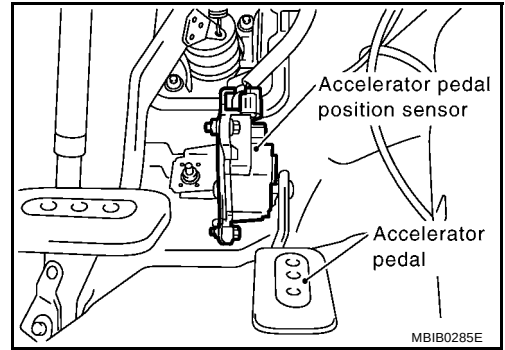
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

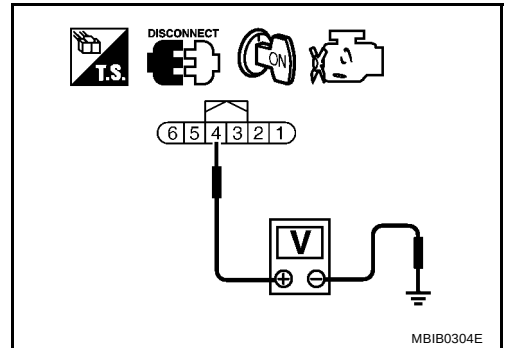


3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. 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 ECM terminal 82 and APP sensor 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 M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

6. CHECK APP SENSOR 1 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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-229, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".

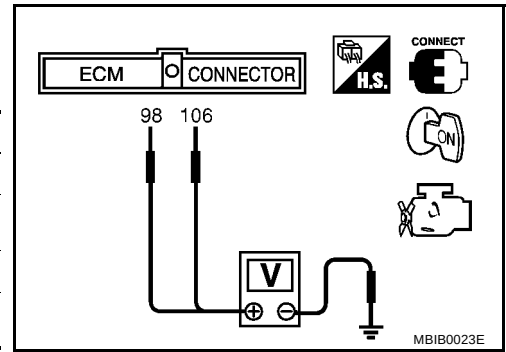
EBS00070

DTC P0227, P0228 APP SENSOR

[CR (WITH EURO-OBD)]

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-34, "Idle Air Volume Learning"](#) .

Remove and Installation

ACCELERATOR PEDAL

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

EBS0007P

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[CR (WITH EURO-OBD)]

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

EBS0007Q

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 MI will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off.

If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.

When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.

If another misfire condition occurs that can damage the TWC, the MI 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 MI 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 injector circuit is open or shorted ● Fuel injectors ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Drive plate or flywheel ● Heated oxygen 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.	

DTC Confirmation Procedure

EBS0007R

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 P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[CR (WITH EURO-OBD)]

WITH CONSULT-II

1. Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

5. If 1st trip DTC is detected, go to [EC-232, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

PBIB0164E

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

EBS0007S

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

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

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace.

3. PERFORM POWER BALANCE TEST

With CONSULT-II

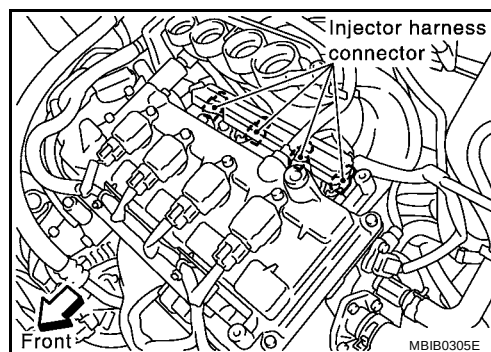
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



MBIB0305E

Yes or No

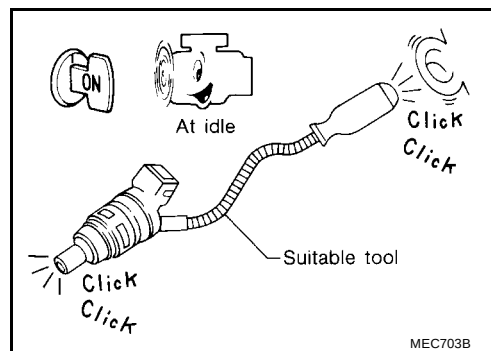
- Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

- Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to [EC-385](#).
["INJECTOR CIRCUIT"](#).



MEC703B

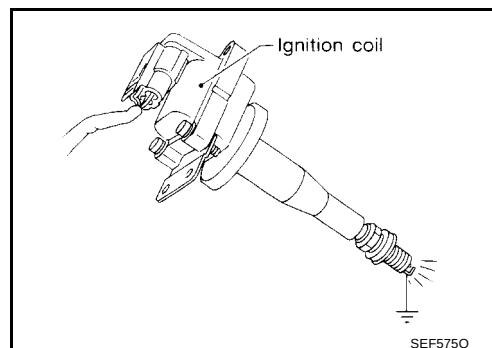
5. CHECK IGNITION SPARK

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known-good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

OK or NG

OK >> GO TO 6.

NG >> Check ignition coil, power transistor and their circuits.
Refer to [EC-376, "IGNITION SIGNAL"](#) .



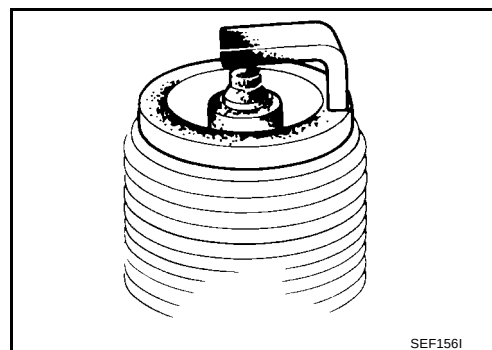
6. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 7.

NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-21, "Changing Spark Plugs \(Platinum-Tipped Type\)"](#) .



7. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-57, "COMPRESSION PRESSURE INSPECTION"](#) .

[kPa (bar, kg/cm² , psi)/350rpm]

Engine type	CR10DE	CR12DE, CR14DE
Standard	1,432 (14.32, 14.6, 208)	1,383 (13.83, 14.1, 201)
minimum	1,236 (12.36, 12.6, 179)	1,187 (11.87, 12.1, 172)
Difference limit among cylinders	98 (0.98, 1.0, 14)	98 (0.98, 1.0, 14)

OK or NG

OK >> GO TO 8.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC-36, "FUEL PRESSURE RELEASE"](#) .
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-37, "FUEL PRESSURE CHECK"](#) .

At idle: Approx. 350 kPa (3.5 bar, 3.57 kg/cm² , 51 psi)

OK or NG

OK >> GO TO 9.

NG >> Follow the construction of "FUEL PRESSURE CHECK".

9. CHECK IGNITION TIMING

Check the following items. Refer to [EC-68, "Basic Inspection"](#) .

Items	Specifications	
Target idle speed	A/T	700 ± 50 rpm (in "P" or "N" position)
	M/T	650 ± 50 rpm
Ignition timing	A/T	5 ± 5° BTDC (in "P" or "N" position)
	M/T	5 ± 5° BTDC

OK or NG

OK >> GO TO 10.

NG >> Follow the "Basic Inspection".

10. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-155, "Component Inspection"](#) .

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

11. CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR

 **With CONSULT-II**

Check manifold absolute pressure sensor signal in "DATA MONITOR" mode with CONSULT-II.

Approximately at idling

1.5V:

Approximately at 2,500 rpm

1.2V:

 **With GST**

Check manifold absolute pressure sensor signal in MODE 1 with GST.

Approximately at idling

1.5V:

Approximately at 2,500 rpm

1.2V:

OK or NG

OK >> GO TO 12.

NG >> Check connectors for rusted terminals or loose connections in the manifold absolute pressure sensor circuit or engine grounds. Refer to [EC-136, "DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR"](#) .

12. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-72, "Symptom Matrix Chart"](#) .

OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

13. 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-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .

>> GO TO 14.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

[CR (WITH EURO-OBD)]

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

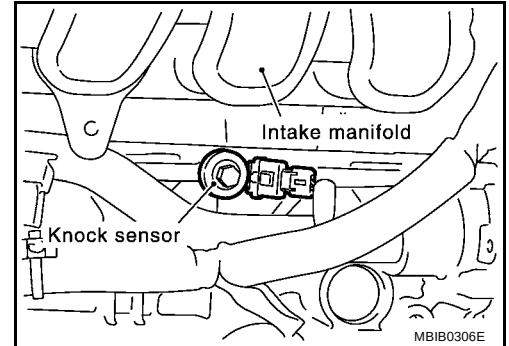
DTC P0327, P0328 KS

PFP:22060

Component Description

EBS0007T

The knock sensor 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.



EBS0007U

On Board Diagnosis Logic

The MI will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	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
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

EBS0007V

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-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-239, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

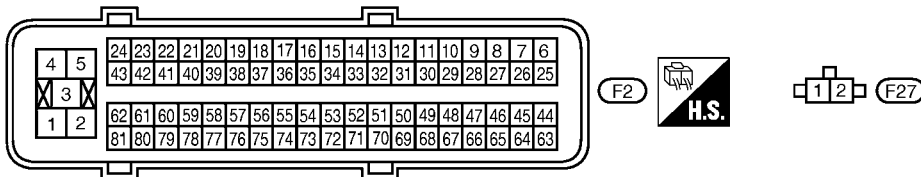
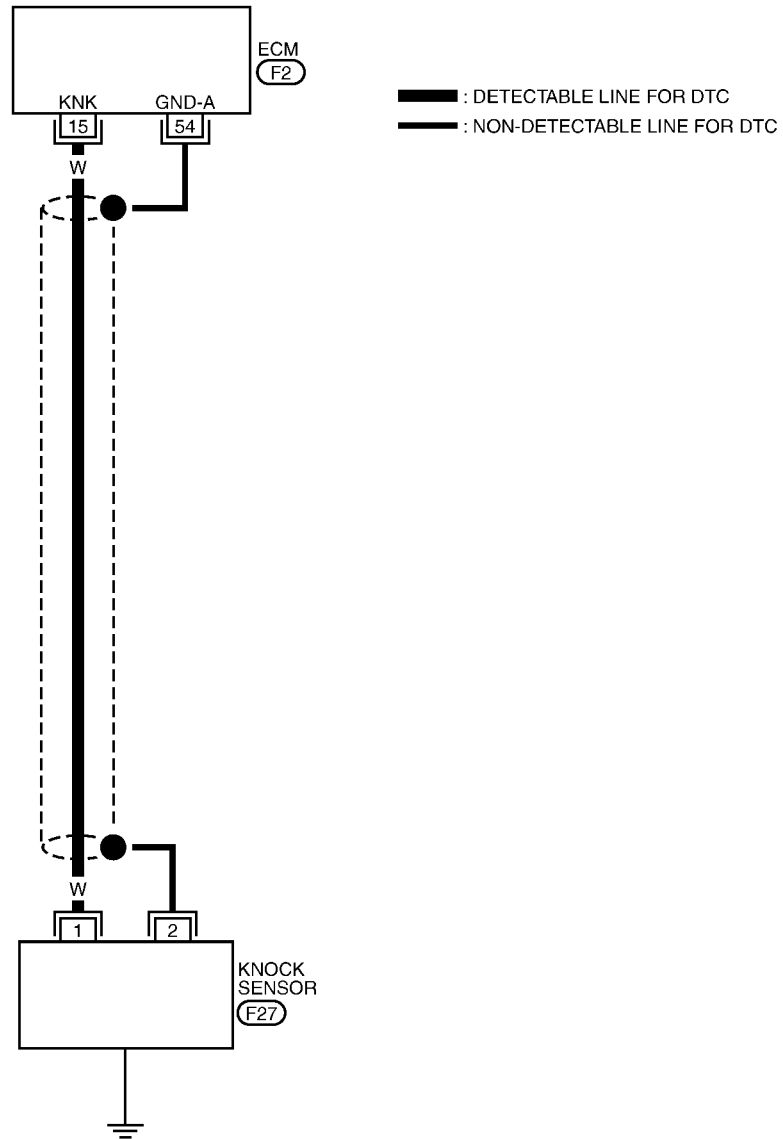
WITH GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

EBS0007W

EC-KS-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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
54	—	Sensors' ground (Knock sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS0007X

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and engine ground. Refer to Wiring Diagram.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

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

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

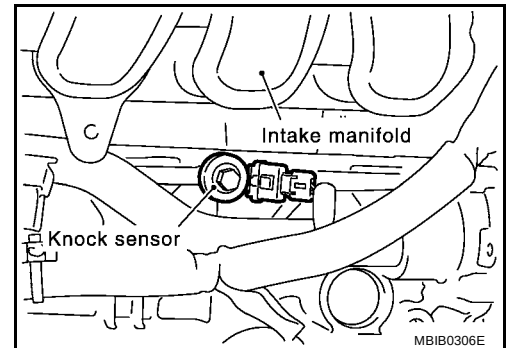
1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK KNOCK SENSOR

Refer to [EC-240, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace knock sensor.

4. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 54 and engine ground.

Continuity should exist

2. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection KNOCK SENSOR

EBS0007Y

Check resistance between knock sensor terminal 1 and ground.

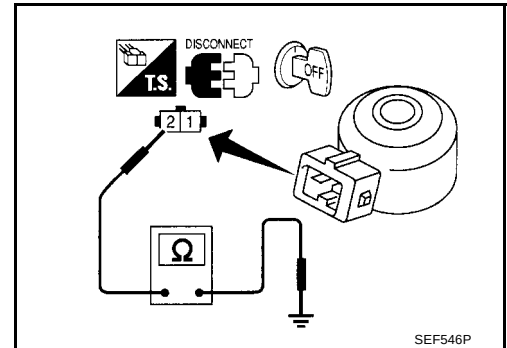
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



EBS0007Z

Removal and Installation KNOCK SENSOR

Refer to [EM-69, "CYLINDER BLOCK"](#) .

DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

EBS00080

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.

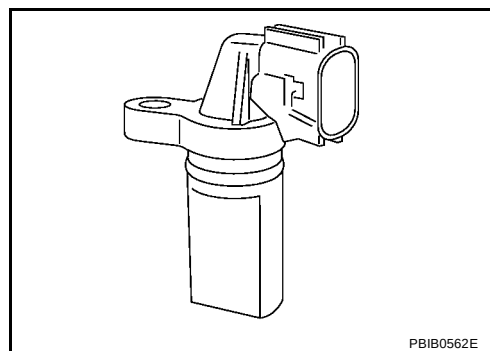
The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor 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.



PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

EBS00081

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

EBS00082

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

EBS00083

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".

E WITH CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-243, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

E WITH GST

Follow the procedure "WITH CONSULT-II" above.

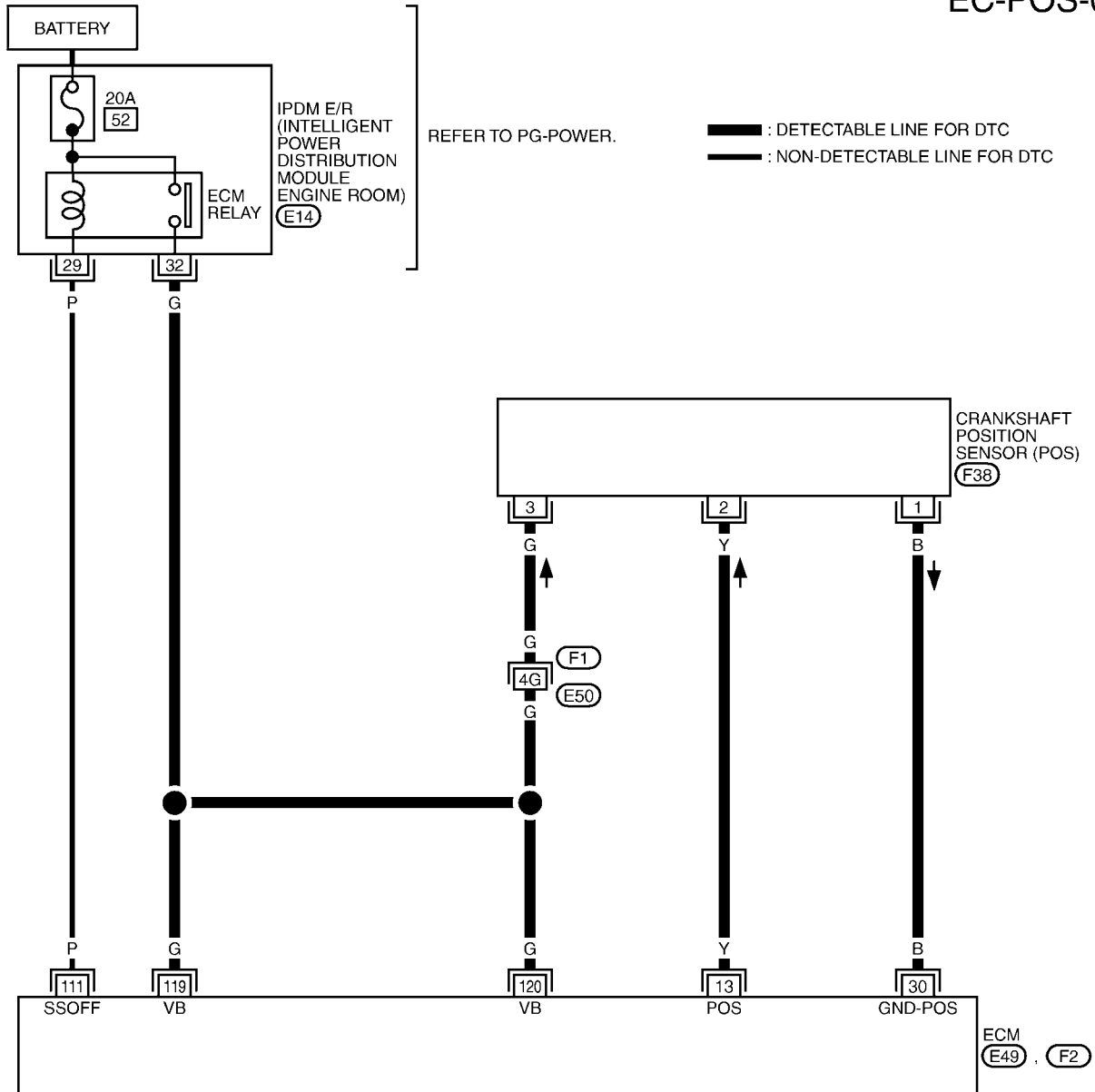
DTC P0335 CKP SENSOR (POS)

[CR (WITH EURO-OBD)]

EBS00084

Wiring Diagram

EC-POS-01



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

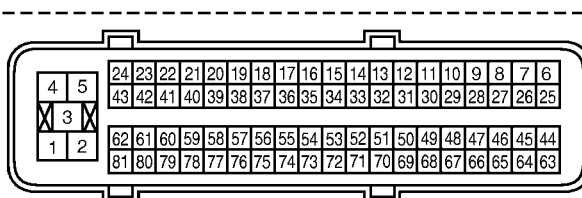
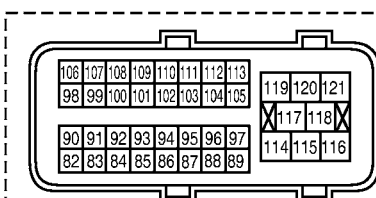
(E14)
W



3 2 1 (F38)
G

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)



MBWA0282E

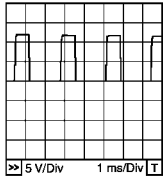
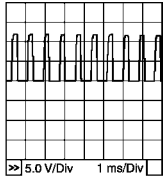
DTC P0335 CKP SENSOR (POS)

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	Y	Crankshaft position sensor (POS)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E
30	B	Sensors' ground (Crankshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

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

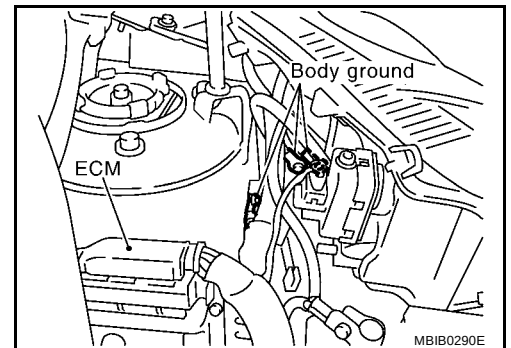
Diagnostic Procedure

EBS00085

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

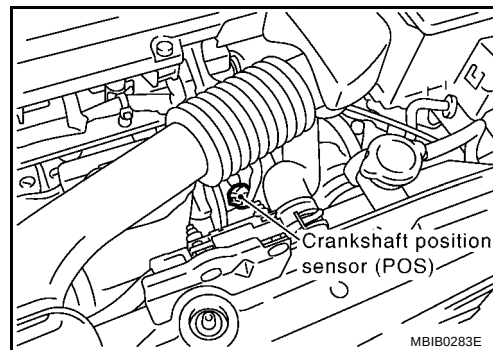


DTC P0335 CKP SENSOR (POS)

[CR (WITH EURO-OBD)]

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch "ON".



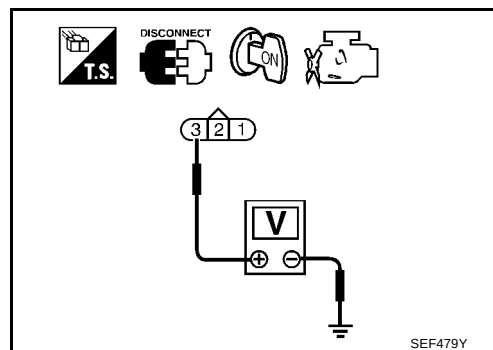
3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. 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 F1, E50
- 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. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for 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 CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2.
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 6.

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

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-245, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.

NG >> Replace the signal plate.

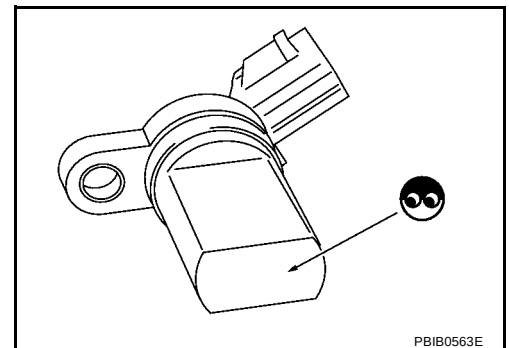
8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection
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.



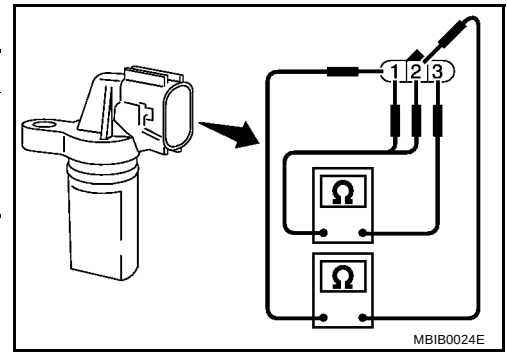
DTC P0335 CKP SENSOR (POS)

[CR (WITH EURO-OBD)]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	

6. If NG, replace crankshaft position sensor (POS).



EBS00087

Removal and Installation CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-69, "CYLINDER BLOCK"](#) .

DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

EBS00088

The camshaft position sensor (PHASE) senses the retraction with intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

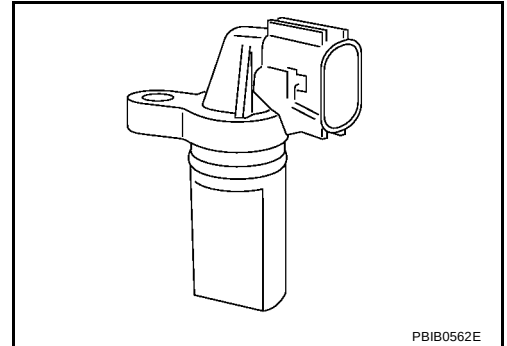
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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.



PBIB0562E

On Board Diagnosis Logic

EBS00089

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set 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-27.) - Starting system circuit (Refer to SC-27.) - Dead (Weak) battery

DTC Confirmation Procedure

EBS0008A

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-II

- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
- If 1st trip DTC is detected, go to [EC-249, "Diagnostic Procedure"](#).
If 1st trip DTC is not detected, go to next step.
- Maintain engine speed at more than 800 rpm for at least 5 seconds.
- If 1st trip DTC is detected, go to [EC-249, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
COOLANT TEMP/S	XXX °C

SEF013Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

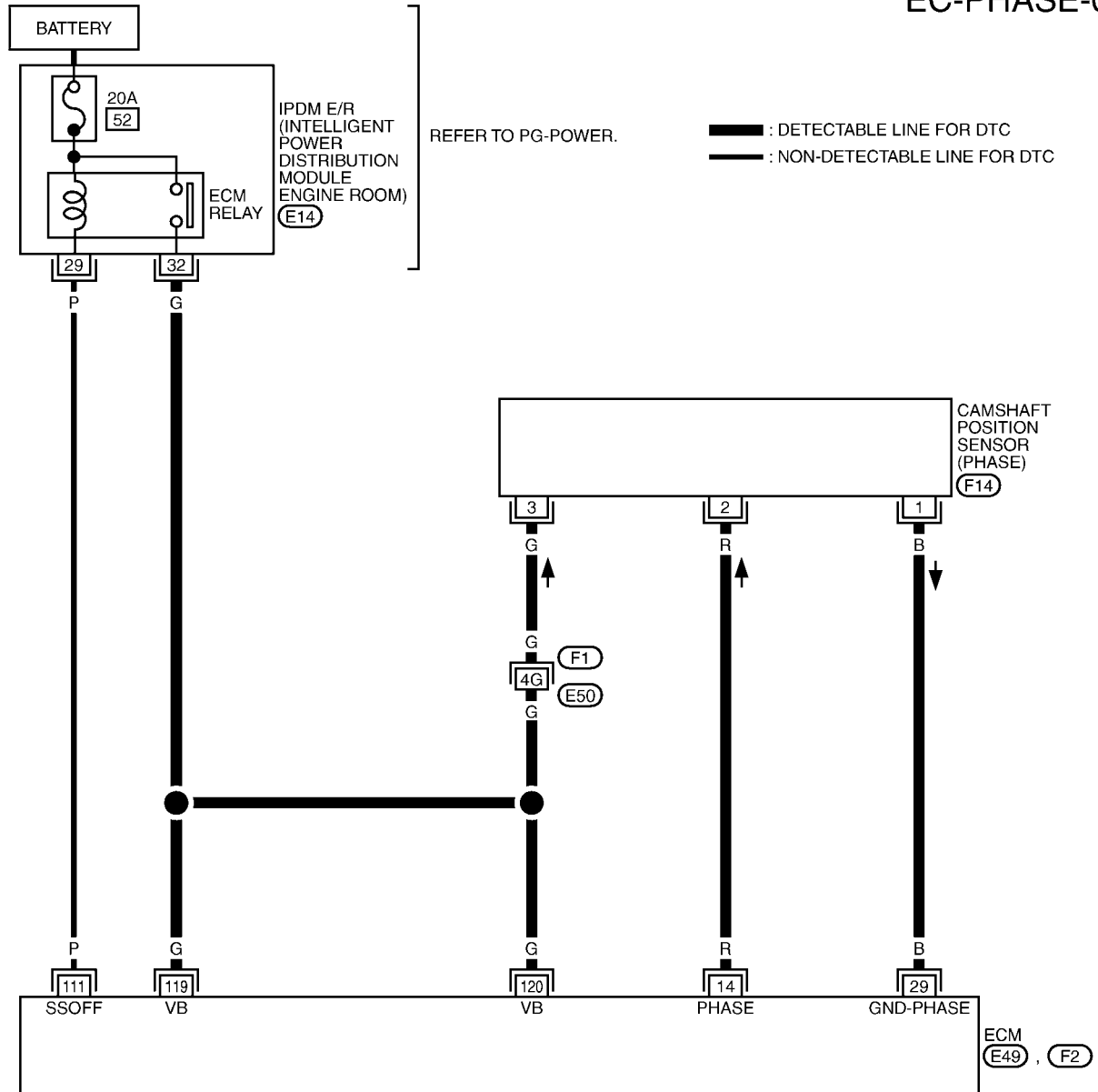
DTC P0340 CMP SENSOR (PHASE)

[CR (WITH EURO-OBD)]

EBS0008B

Wiring Diagram

EC-PHASE-01



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

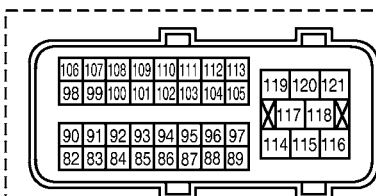
(E14)
W



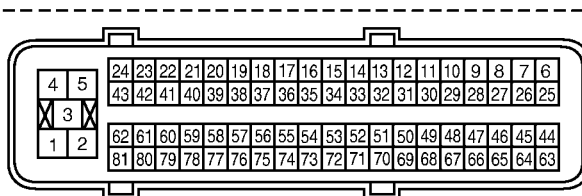
3 2 1 (F14)
B

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)



(E49)



(F2)



MBWA0283E

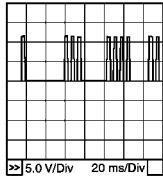
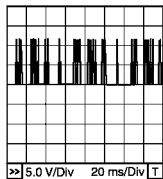
DTC P0340 CMP SENSOR (PHASE)

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	[Engine is running] ● Warm-up condition ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
29	B	Sensors' ground (Camshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

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

Diagnostic Procedure

1. CHECK STARTING SYSTEM

Turn ignition switch to "START" position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

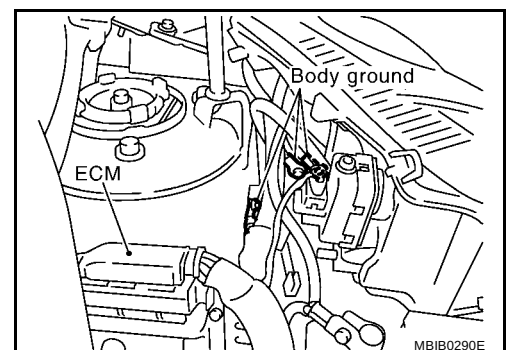
Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-27, "STARTING SYSTEM"](#) .)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 3.

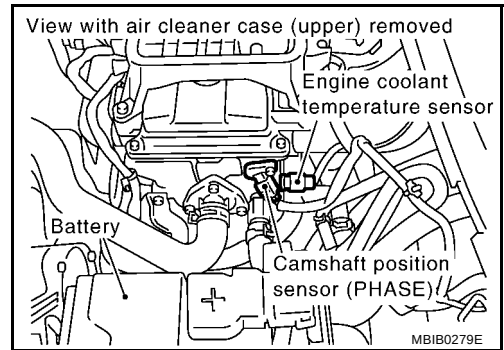


DTC P0340 CMP SENSOR (PHASE)

[CR (WITH EURO-OBD)]

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch "ON".



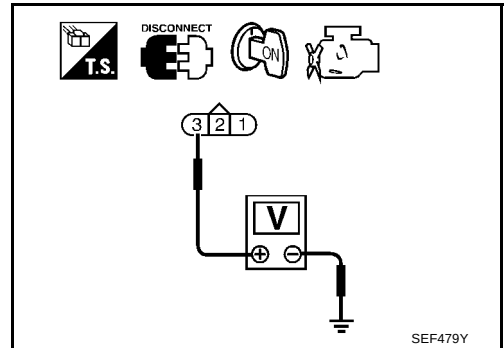
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

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 F1, E50
- 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. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground. 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.

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or 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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-251, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace camshaft position sensor (PHASE).

8. CHECK CAMSHAFT (INTAKE)

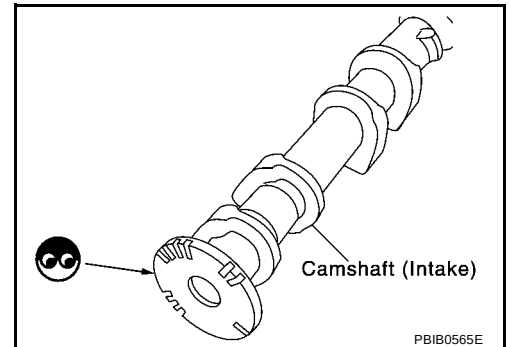
Check the following.

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

OK or NG

OK >> GO TO 9.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



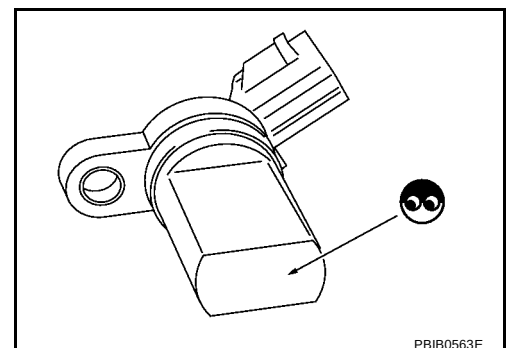
9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection 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.

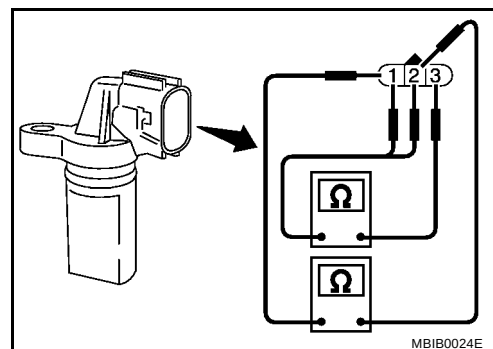


DTC P0340 CMP SENSOR (PHASE)

[CR (WITH EURO-OBD)]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EM-34, "CAMSHAFT"](#) .

EBS0008E

DTC P0420 THREE WAY CATALYST FUNCTION

[CR (WITH EURO-OBD)]

DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

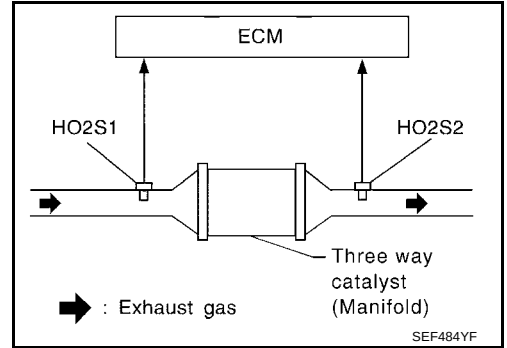
On Board Diagnosis Logic

EBS0008F

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 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 heated oxygen sensors 1 and 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	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 injectors - Fuel injector leaks - Spark plug - Improper ignition timing

DTC Confirmation Procedure

EBS0008G

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-II

TESTING CONDITION:

- Open engine hood before conducting the following procedure.
 - Do not hold engine speed for more than the specified minutes below.
- 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 one minute under no load.
 - Let engine idle for one minute.
 - Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
 - Start engine.
 - 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 "COMPLT", go to step 10.
 - Wait 5 seconds at idle.

SRT WORK SUPPORT	
CATALYST	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

PBIB0566E

DTC P0420 THREE WAY CATALYST FUNCTION

[CR (WITH EURO-OBD)]

9. 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.

SRT WORK SUPPORT	
CATALYST	CMPLT
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

PBIB0567E

- 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-II.
- c. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
- d. When "COOLANTEMP/S" indication reaches to 70°(158°F), go to step 3.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

10. Select "SELF-DIAG RESULTS" mode with CONSULT-II.
11. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to [EC-255, "Diagnostic Procedure"](#).

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

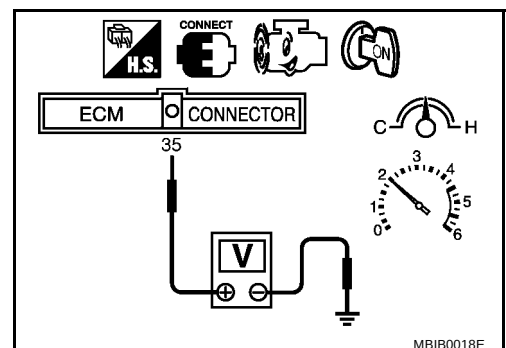
Overall Function Check

EBS0008H

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 4,00 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Open engine hood.
6. Set voltmeters probes between ECM terminal 35 (HO2S1 signal) and engine ground, and ECM terminal 16 (HO2S2 signal) and engine ground.
7. Keep engine speed at 2,000 rpm constant under no load.



DTC P0420 THREE WAY CATALYST FUNCTION

[CR (WITH EURO-OBD)]

8. Make sure that the voltage switching frequency (high & low) between ECM terminal 16 and engine ground is very less than that of ECM terminal 35 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 voltage switching frequency

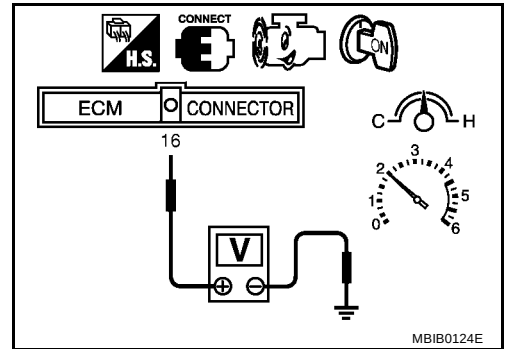
B: Heated oxygen sensor 1 voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to [EC-255, "Diagnostic Procedure"](#).

NOTE:

If the voltage at terminal 35 does not switch periodically more than 5 times within 10 seconds at step 8, perform trouble diagnosis for "DTC P0133" first. (See [EC-161](#).)



Diagnostic Procedure

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

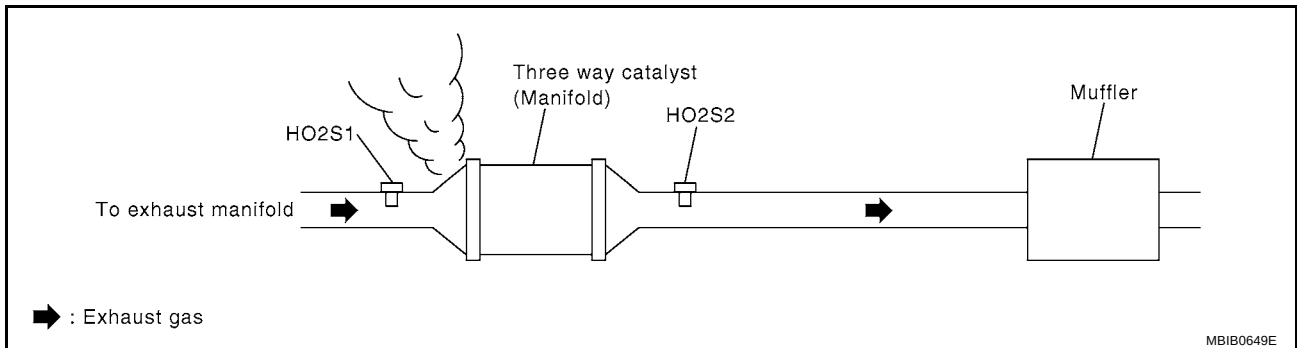
OK or NG

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 manifold absolute pressure sensor.

OK or NG

OK >> GO TO 4.

NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to [EC-68, "Basic Inspection"](#).

Items	Specifications	
Ignition timing	A/T	5° ± 5° BTDC (in "P" or "N" position)
	M/T	5° ± 5° BTDC
Target idle speed	A/T	700 ± 50 rpm (in "P" or "N" position)
	M/T	650 ± 50 rpm

DTC P0420 THREE WAY CATALYST FUNCTION

[CR (WITH EURO-OBD)]

OK or NG

OK >> GO TO 5.

NG >> Follow the [EC-68, "Basic Inspection"](#) .

5. CHECK INJECTORS

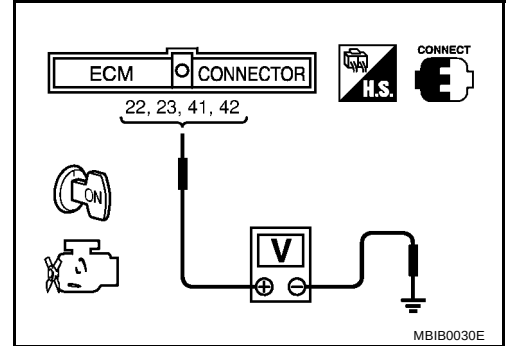
1. Refer to Wiring Diagram for Injectors, [EC-386](#) .
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.

Battery voltage should exist.

OK or NG

OK >> GO TO 6.

NG >> Perform [EC-387, "Diagnostic Procedure"](#) .



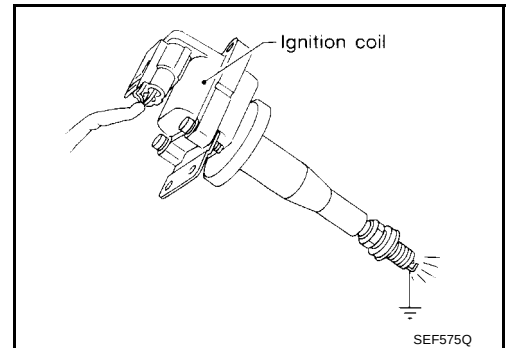
6. CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known-good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.

OK or NG

OK >> GO TO 7.

NG >> Check ignition coil with power transistor and their circuit.
Refer to [EC-376, "IGNITION SIGNAL"](#) .



7. CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly.
Refer to [EM-28, "FUEL INJECTOR AND FUEL TUBE"](#) .
Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch "ON".
Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.

NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

Trouble is fixed.>>**INSPECTION END**

Trouble is not fixed.>>Replace three way catalyst (Manifold).

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PPF:14920

Description SYSTEM DESCRIPTION

EBS0008J

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 volume control solenoid valve
Manifold absolute pressure 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	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed signal* ²	Vehicle speed		

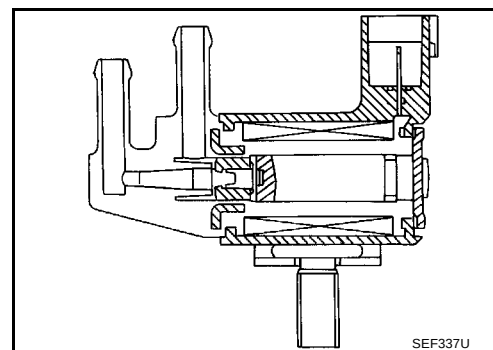
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*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-II Reference Value in Data Monitor Mode

EBS0008K

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%

On Board Diagnosis Logic

EBS0008L

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

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

EBS0008M

DTC Confirmation Procedure

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to [EC-260, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

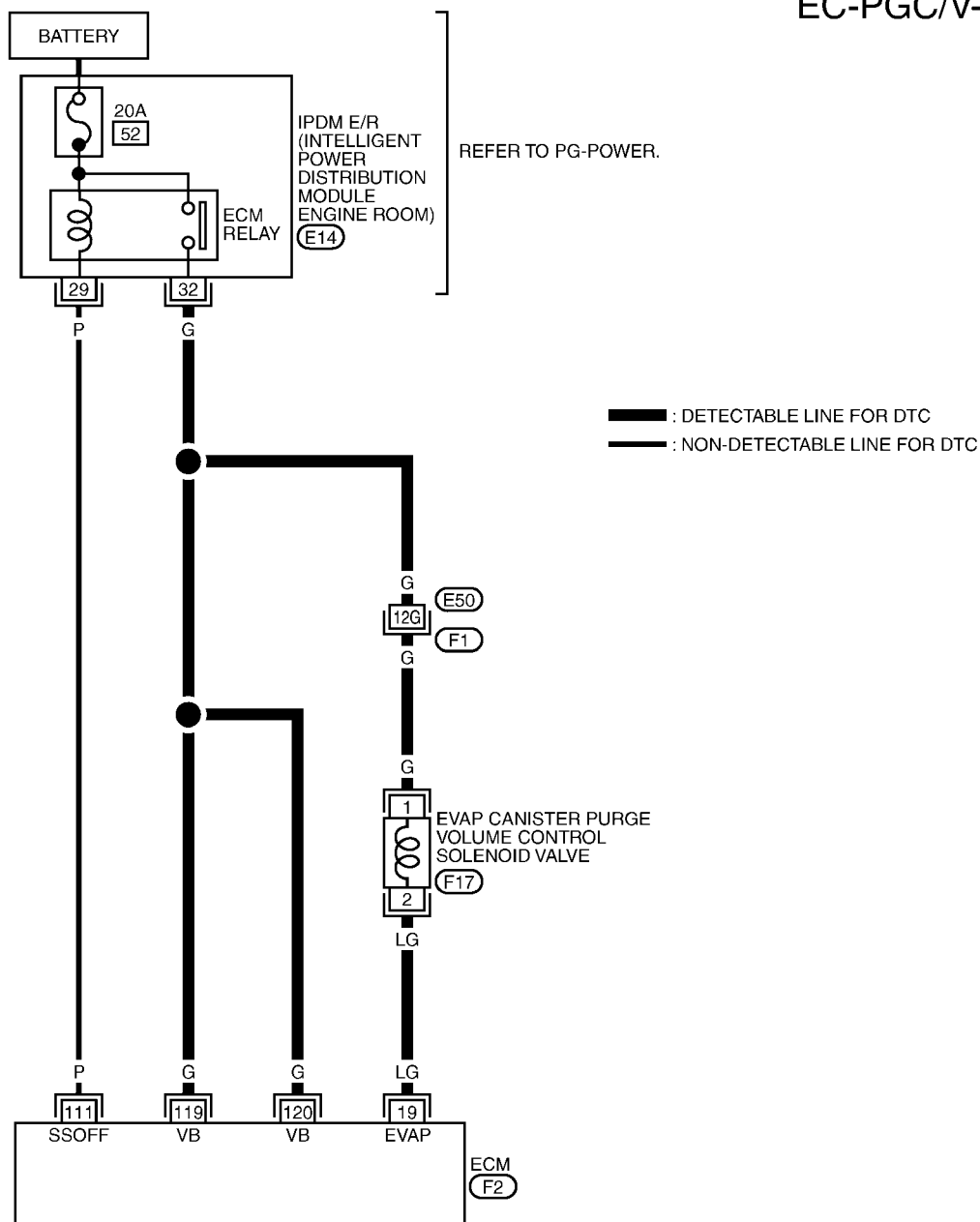
Follow the procedure "WITH CONSULT-II" above.

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

Wiring Diagram

EBS0008N

EC-PGC/V-01



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

(E14)
W



4	5	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
3	3	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
1	2	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
		81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63

(F2)



2 1
F17
L

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE
JUNCTION (SMJ)

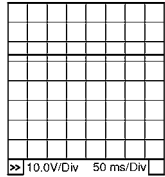
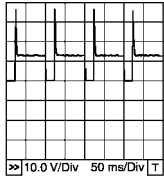
MBWA0284E

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	LG	EVAP canister purge volume control solenoid valve	[Engine is running] Idle speed	BATTERY VOLTAGE (11 - 14V)★  >> 10.0V/Div 50 ms/Div PBIB0050E
			[Engine is running] Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  >> 10.0 V/Div 50 ms/Div PBIB0520E

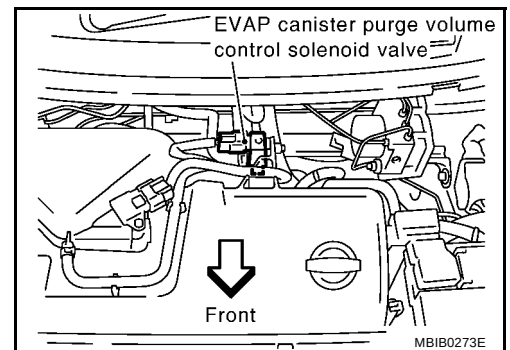
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00080

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch "ON".

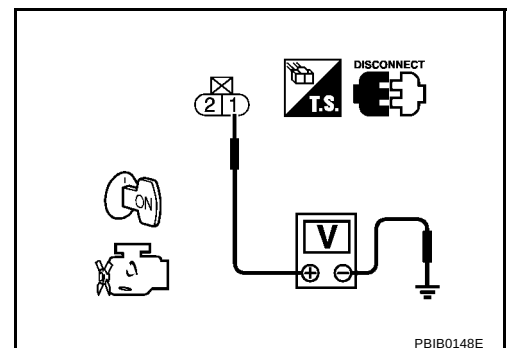


- Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- Harness for open or short between EVAP canister purge volume control solenoid valve and 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 19 and EVAP canister purge volume 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 (With CONSULT-II)>>GO TO 4.

OK (Without CONSULT-II)>>GO TO 5.

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

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

 **With CONSULT-II**

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0569E

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-262, "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-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITH EURO-OBD)]

Component Inspection

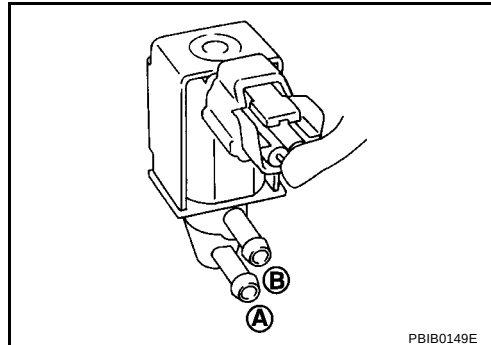
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

EBS0008P

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

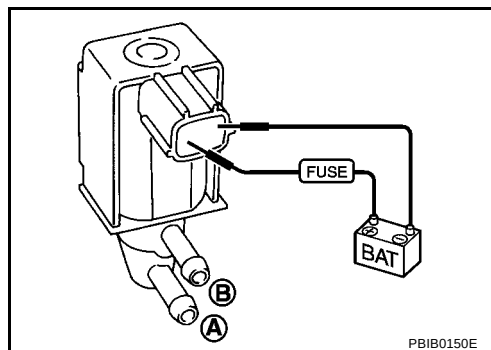
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No



Without CONSULT-II

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

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

EBS0008Q

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P0500 VSS

PFP:32702

Description

EBS0008R

NOTE:

If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-120, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

The vehicle speed signal is sent to the combination meter from the ABS actuator and electric unit (control unit) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

EBS0008S

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.) ● ABS control unit ● ABS actuator and electric unit (control unit) ● Wheel sensor ● Combination meter

DTC Confirmation Procedure

EBS0008T

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-II

1. Start engine.
2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to [EC-264, "Diagnostic Procedure"](#).
If OK, go to following step.
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 2,300 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.8 - 31.8 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6. If 1st trip DTC is detected, go to [EC-264, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

Overall Function Check

EBS0008U

Use this procedure to check the overall function of the vehicle speed signal 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 signal in "MODE 1" with GST.
The vehicle speed signal 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-264, "Diagnostic Procedure"](#) .

Diagnostic Procedure

EBS0008V

1. CHECK DTC

Refer to [BRC-6, "TROUBLE DIAGNOSIS"](#) .

OK or NG

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

2. CHECK COMBINATION METER

Check combination meter function.

Refer to [DI-5, "COMBINATION METERS"](#) .

>> **INSPECTION END**

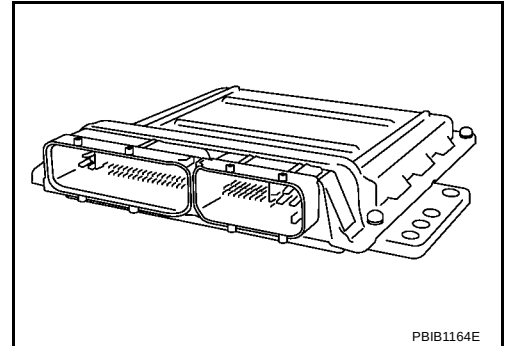
DTC P0605 ECM

PFP:23710

Component Description

EBS0008W

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



EBS0008X

On Board Diagnosis Logic

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 EEPROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when 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.

DTC Confirmation Procedure

EBS0008Y

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-266, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

② With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B **With CONSULT-II**

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4. If 1st trip DTC is detected, go to [EC-266. "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION C **With CONSULT-II**

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to [EC-266. "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

EBS0008Z

1. INSPECTION START **With CONSULT-II**

1. Turn ignition switch "ON".
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-265](#).
5. Is the 1st trip DTC P0605 displayed again?

 With GST

1. Turn ignition switch "ON".
2. Select MODE 4 with GST.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-265](#).
5. 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 [EC-52, "NATS \(Nissan Anti-theft System\)"](#).
3. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-34, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-34, "Idle Air Volume Learning"](#).

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

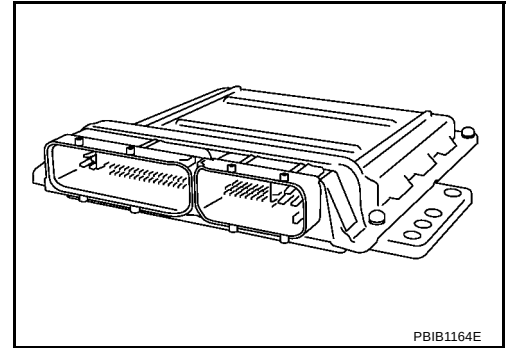
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

EBS00090

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.



On Board Diagnosis Logic

EBS00091

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

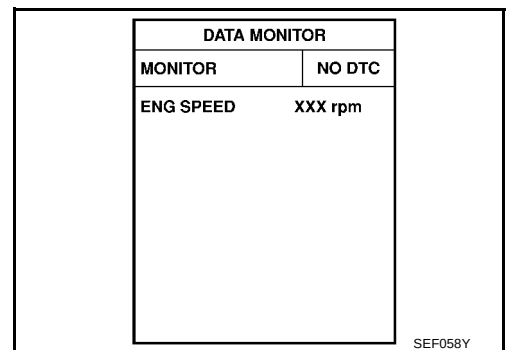
EBS00092

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-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to [EC-270, "Diagnostic Procedure"](#).

**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

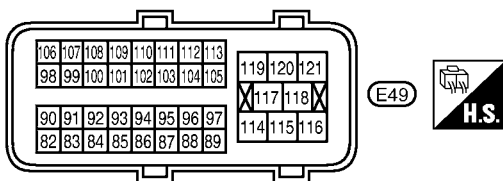
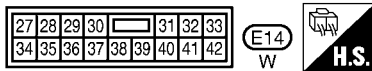
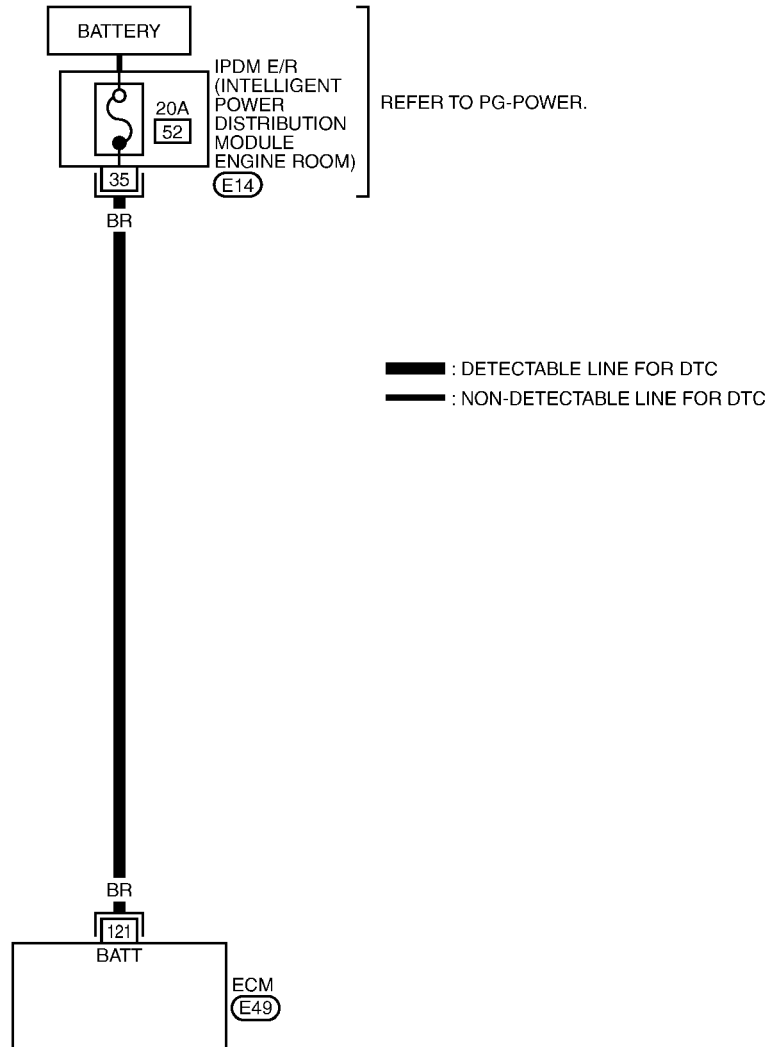
DTC P1065 ECM POWER SUPPLY

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS00O93

EC-ECM/PW-01



MBWA0285E

DTC P1065 ECM POWER SUPPLY

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	BR	Power supply for ECM (Buck-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00094

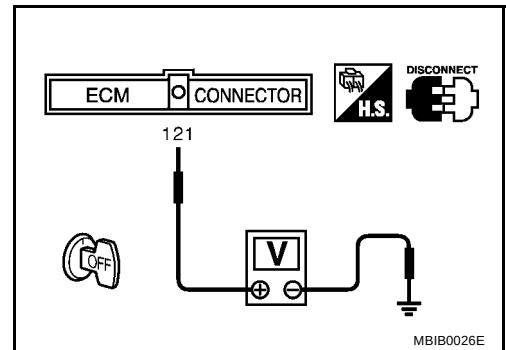
1. CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II 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 E14
- Harness for open or short between ECM and IPDM E/R

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE **With CONSULT-II**

1. Turn ignition switch "ON".
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-268](#).
5. Is the 1st trip DTC P1065 displayed again?

 With GST

1. Turn ignition switch "ON".
2. Select MODE 4 with GST.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-268](#).
5. 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 [EC-52, "NATS \(Nissan Anti-theft System\)"](#).
3. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-34, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-34, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P1111 IVT CONTROL SOLENOID VALVE

[CR (WITH EURO-OBD)]

DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

EBS00095

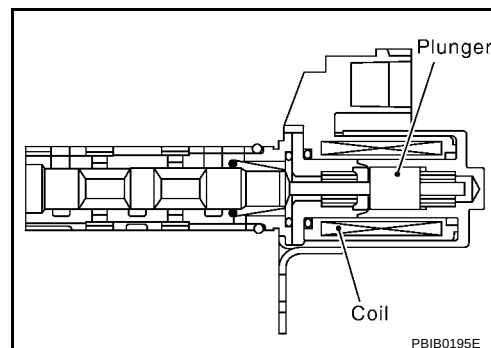
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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-II Reference Value in Data Monitor Mode

EBS00096

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up	Idle	0% - 2%
	● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	When revving engine up to 2,000 rpm quickly	Approx. 0% - 50%

On Board Diagnosis Logic

EBS00097

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	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

DTC Confirmation Procedure

EBS00098

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to [EC-274, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Following the procedure "WITH CONSULT-II" above.

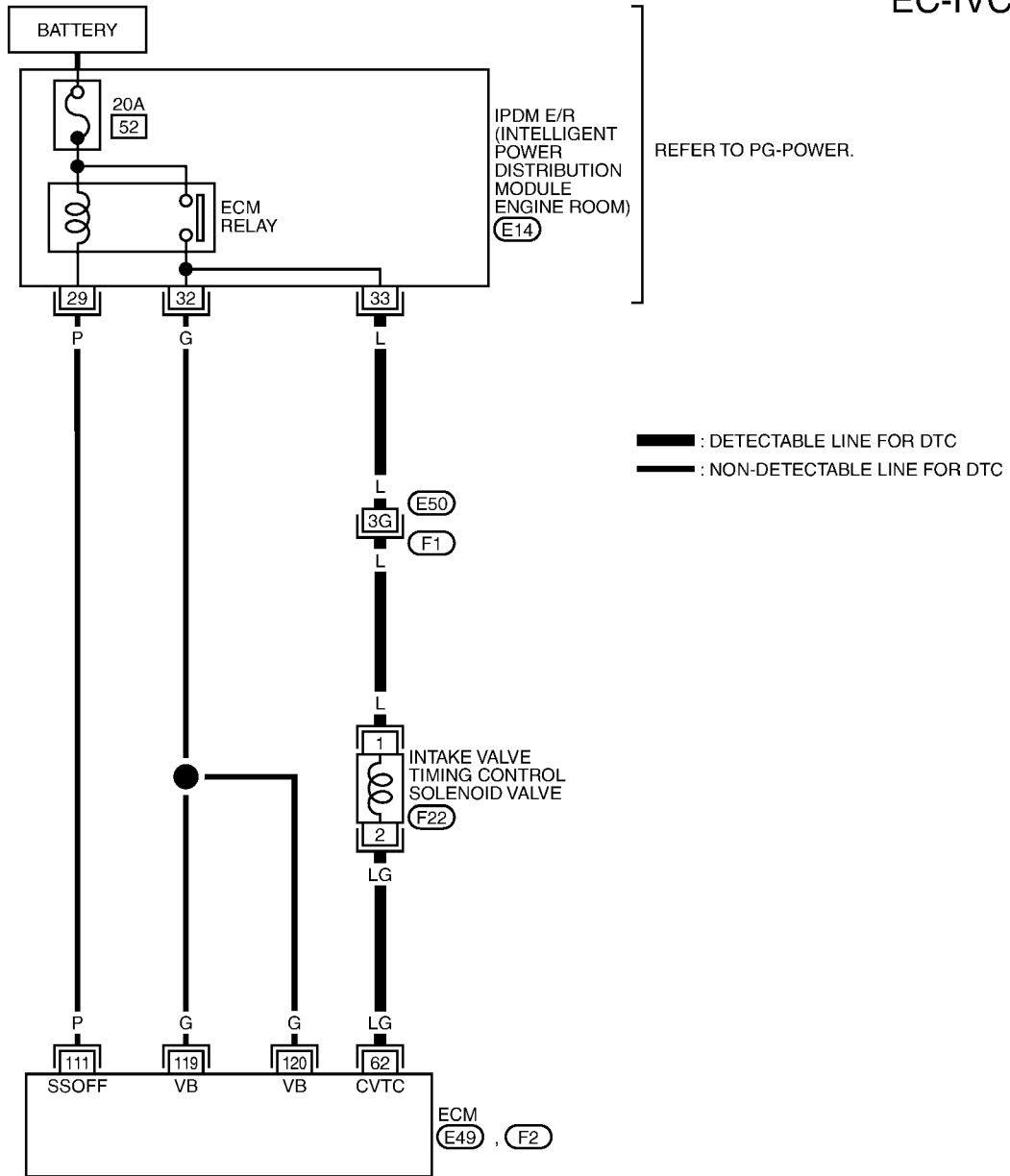
DTC P1111 IVT CONTROL SOLENOID VALVE

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS00099

EC-IVC-01



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

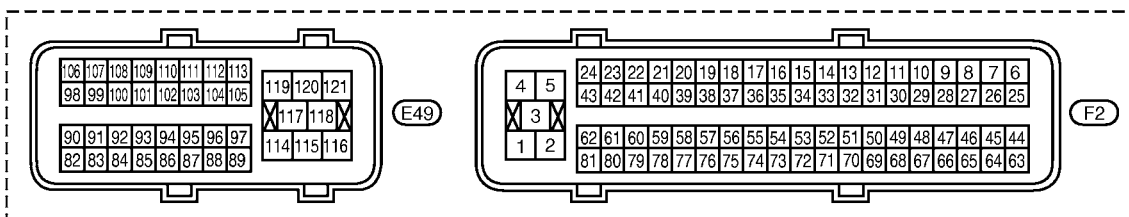
(E14)
W



1 2
(F22)
G

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE
JUNCTION (SMJ)



MBWA0303E

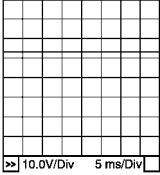
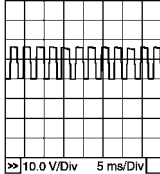
DTC P1111 IVT CONTROL SOLENOID VALVE

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	LG	Intake valve timing control solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● Warm-up condition ● When revving engine up to 2,000 rpm quickly	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB0532E

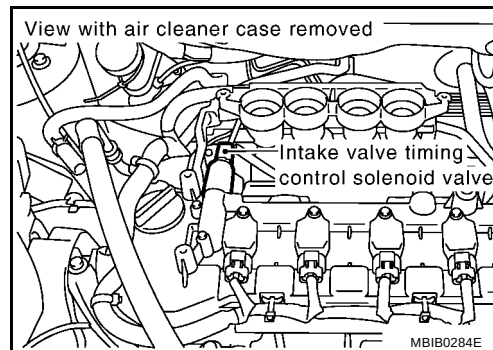
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS0009A

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch "ON".

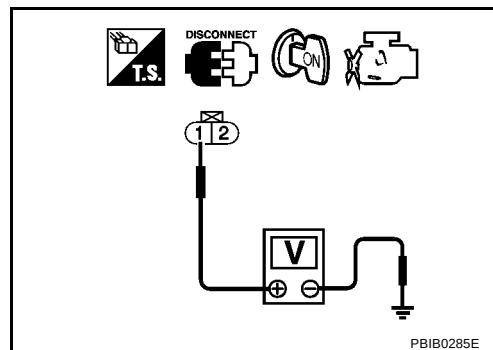


4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



DTC P1111 IVT CONTROL SOLENOID VALVE

[CR (WITH EURO-OBD)]

2. DETECT MALFUNCTION PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace 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 62 and intake valve timing 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 4.

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

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-275, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

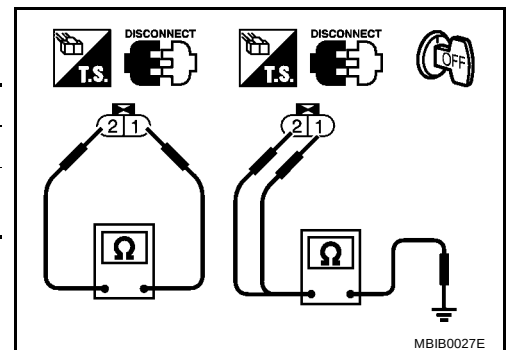
Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection 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 terminals 1 and 2 under the following conditions.

Terminals	Resistance
1 and 2	Approximately 7.2Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-31, "ROCKER COVER"](#).

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

[CR (WITH EURO-OBD)]

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PF161119

Component Description

EBS0009D

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

EBS0009E

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. This self-diagnosis has the one trip detection logic.	

FAIL-SAFE MODE

When the malfunction A or B is detected in the two consecutive trips, the ECM enters fail-safe mode and the MIL lights up.

When the malfunction C is detected even in the 1st trip, 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, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

EBS0009F

NOTE:

- Perform "PROCEDURE FOR MALFUNCTION A AND B" first. If the 1st trip 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-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.
4. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
5. If 1st trip DTC is detected, go to [EC-277, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
SEF058Y	

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR [CR (WITH EURO-OBD)]

With GST

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.
4. Shift selector lever to "N" or "P" 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-277, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

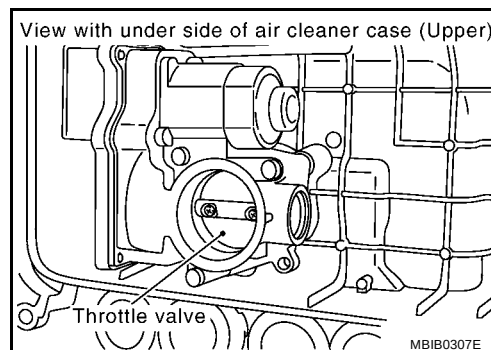
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve 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-34, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-34, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITH EURO-OBD)]

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

EBS0009I

NOTE:

If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to [EC-276](#) or [EC-284](#).

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

EBS0009J

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 problem	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, the ECM enters fail-safe mode and the MI 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

EBS0009K

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-II

1. Turn ignition switch "ON" and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-280, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

② WITH GST

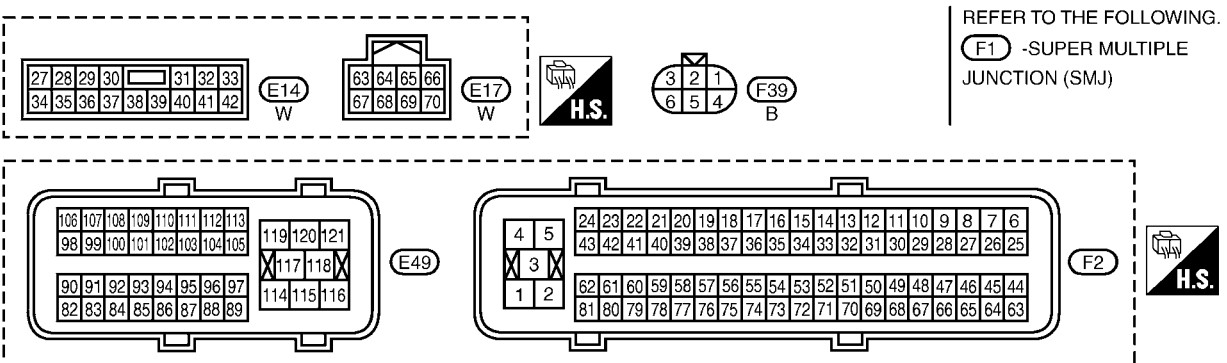
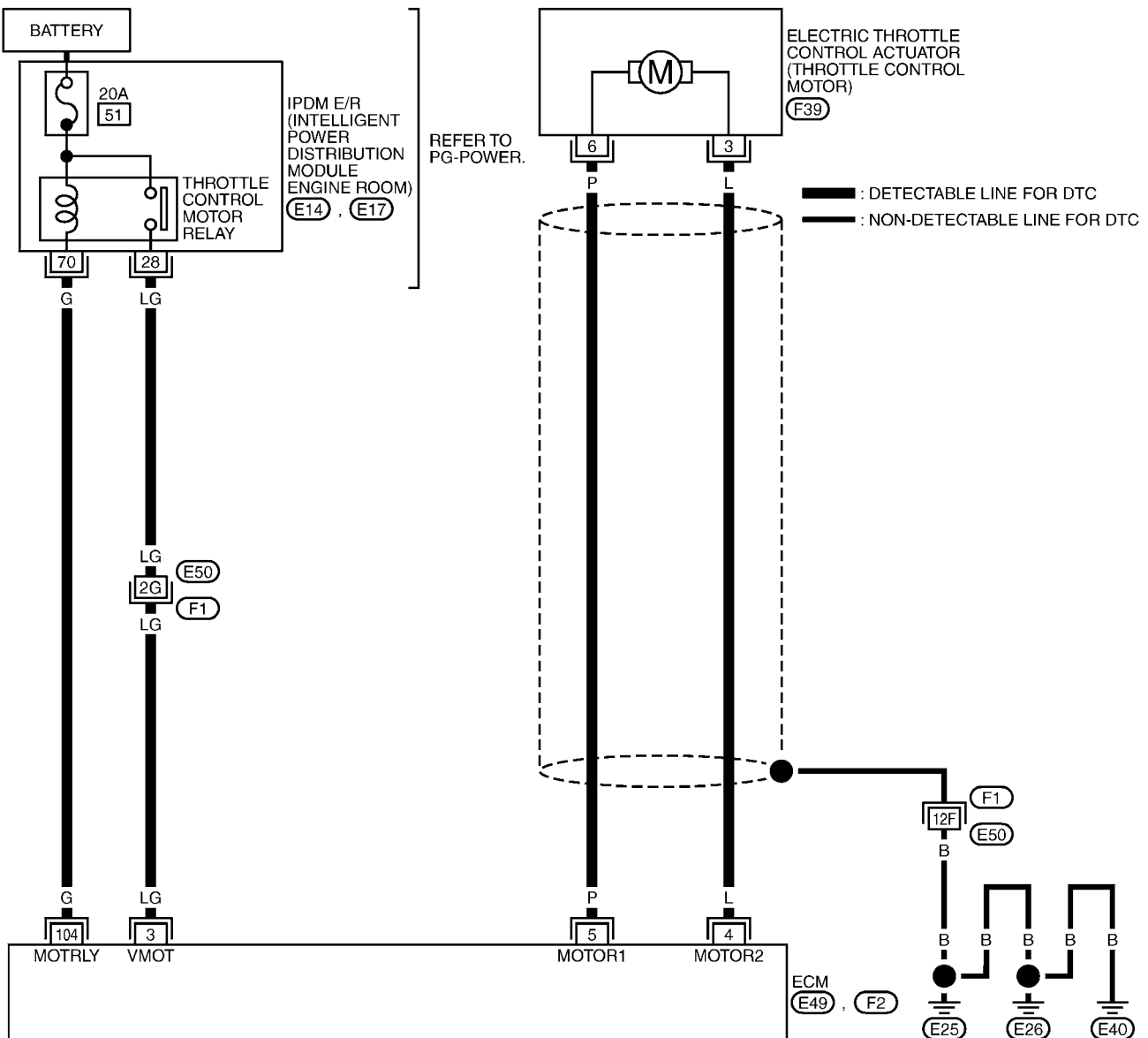
Follow the procedure "WITH CONSULT-II" above.

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION [CR (WITH EURO-OBD)]

Wiring Diagram

EBS0009L

EC-ETC1-01



MBWA0286E

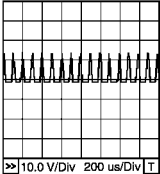
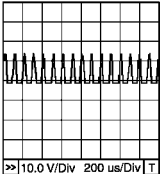
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
4	L	Throttle control motor (Close)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	P	Throttle control motor (Open)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
104	G	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.)

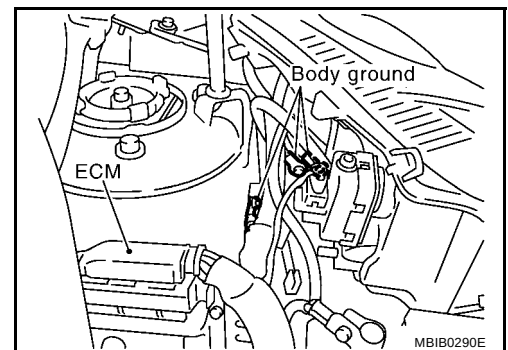
Diagnostic Procedure

EBS0009M

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION [CR (WITH EURO-OBD)]

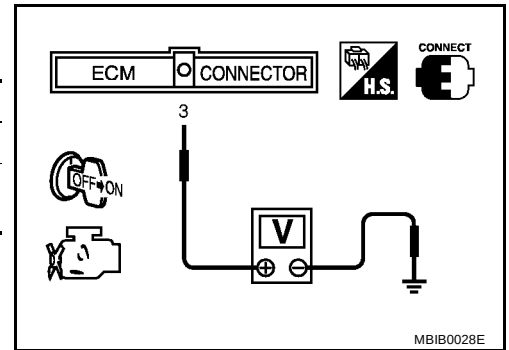
2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 10.
NG >> GO TO 3.



3. 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 E14.
4. Check harness continuity between ECM terminal 3 and IPDM E/R terminal 28. 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 E50, F1
- IPDM E/R harness connector E14
- 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.

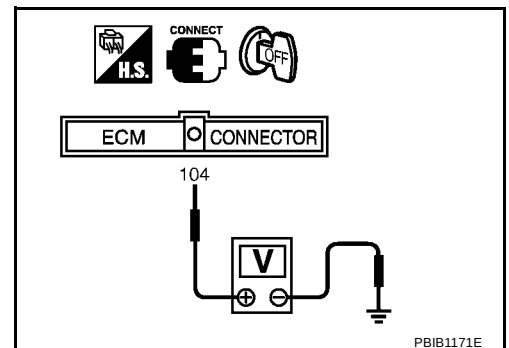
5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "OFF".
3. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 6.



DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITH EURO-OBD)]

6. 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 70.
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.

7. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E17
- 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 FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 9.
NG >> Replace 20A fuse.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

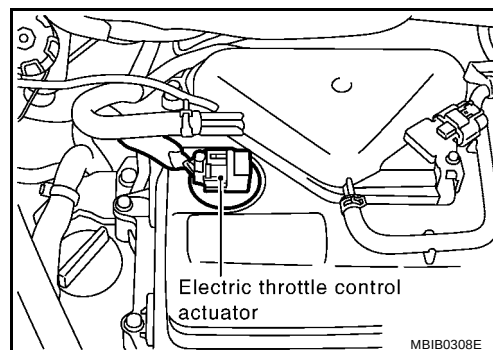
1. Turn ignition switch "OFF".
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
3	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 11.
NG >> Repair or replace.



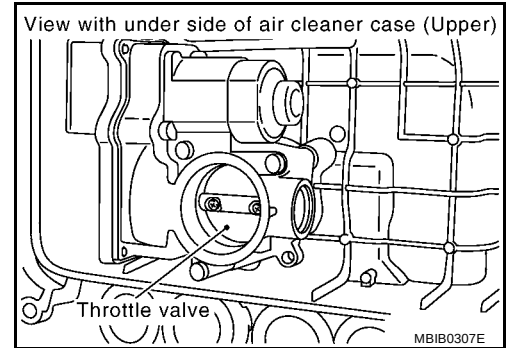
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION [CR (WITH EURO-OBD)]

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

- OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-283, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

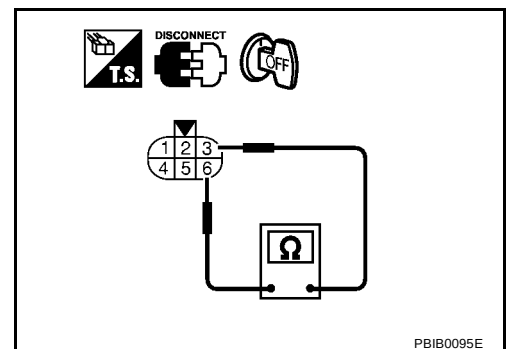
Component Inspection THROTTLE CONTROL MOTOR

EBS0009N

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 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-34, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-34, "Idle Air Volume Learning"](#) .



EBS0009O

Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[CR (WITH EURO-OBD)]

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

EBS0009P

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-II Reference Value in Data Monitor Mode

EBS0009Q

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

EBS0009R

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, the ECM enters fail-safe mode and the MI 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

EBS0009S

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 10V at idle.

With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-287, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With GST

Follow the procedure "With CONSULT-II" above.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[CR (WITH EURO-OBD)]

PROCEDURE FOR DTC P1126

-  **With CONSULT-II**
1. Turn ignition switch “ON” and wait at least 2 seconds.
 2. Select “DATA MONITOR” mode with CONSULT-II.
 3. Start engine and let it idle for 5 seconds.
 4. If DTC is detected, go to [EC-287, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

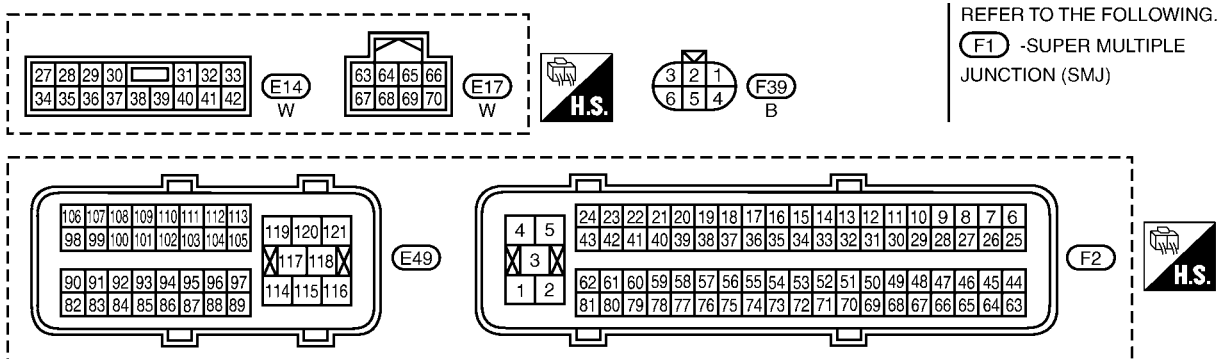
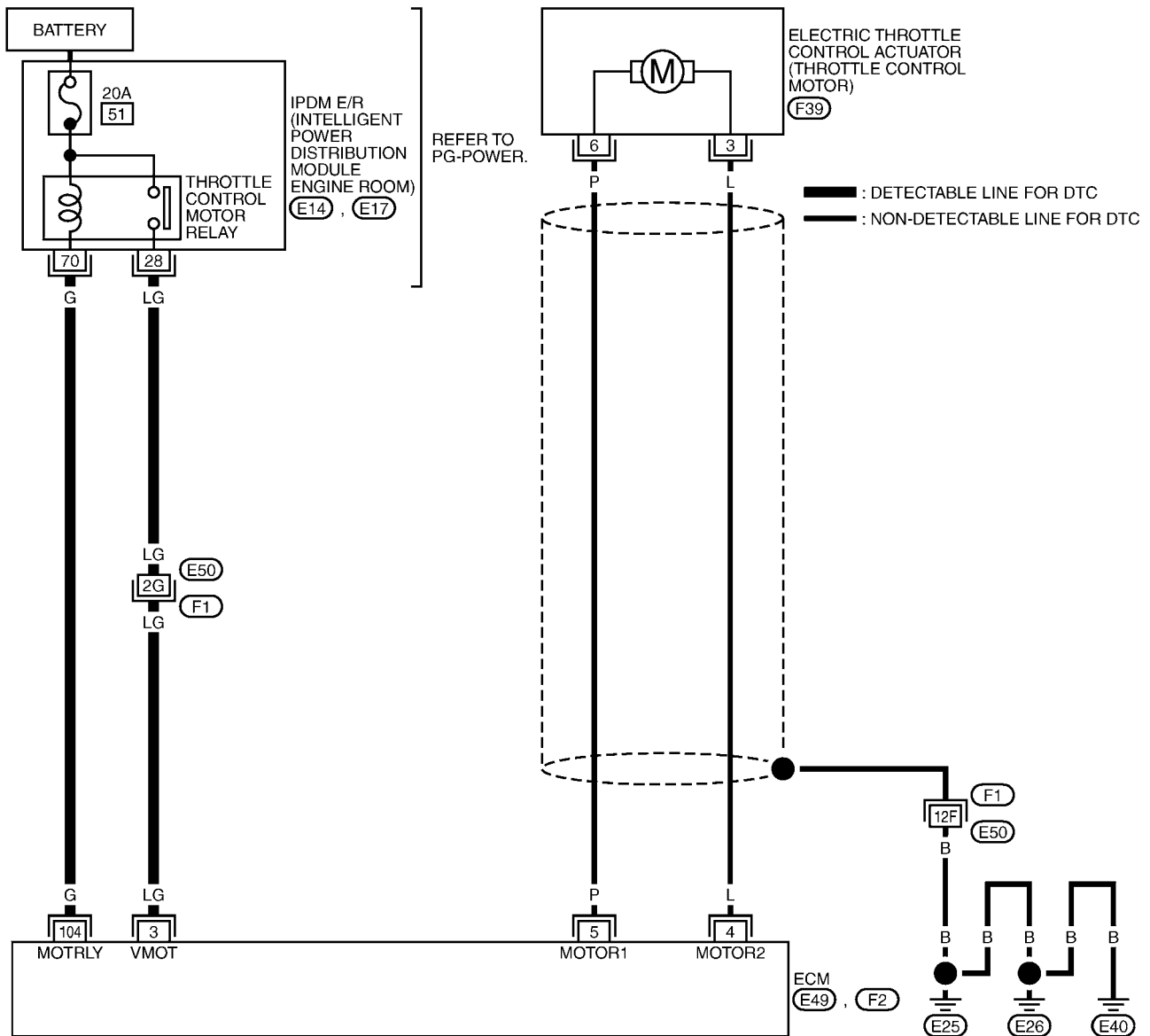
-  **With GST**
- Follow the procedure “With CONSULT-II” above.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITH EURO-OBD)]

Wiring Diagram

EBS0009T

EC-ETC2-01



MBWA0287E

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
104	G	Throttle control motor relay	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

Diagnostic Procedure

EBS0009U

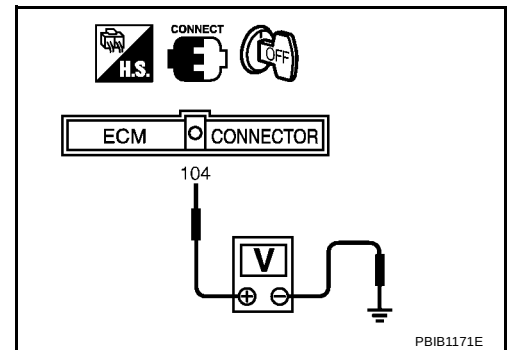
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF".
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.



2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL 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 70.

Continuity should exist.

4. 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.

- IPDM E/R harness connector E17
- Harness for open or short between ECM and IPDM E/R

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

4. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 8.
NG >> Replace 20A fuse.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITH EURO-OBD)]

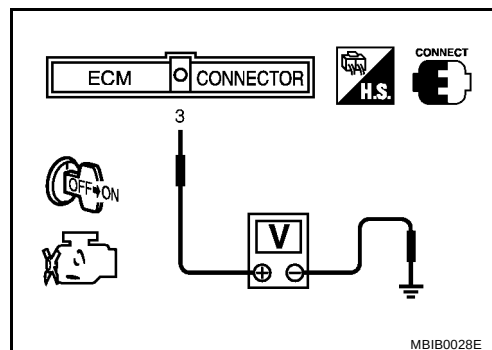
5. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT-I

1. Reconnect all disconnected connectors.
2. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6. 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 E14.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 28.
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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- 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-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITH EURO-OBD)]

DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

EBS0009W

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

EBS0009X

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 MI 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

EBS0009Y

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-II

1. Turn ignition switch "ON" and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-291. "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

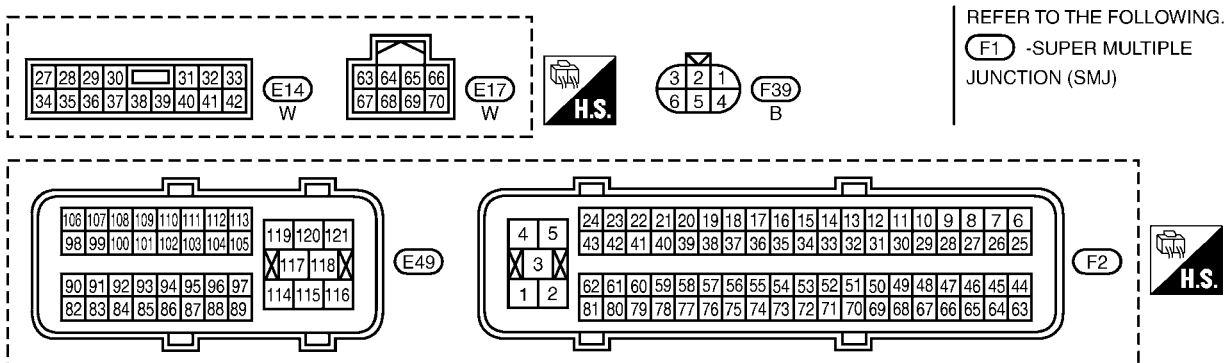
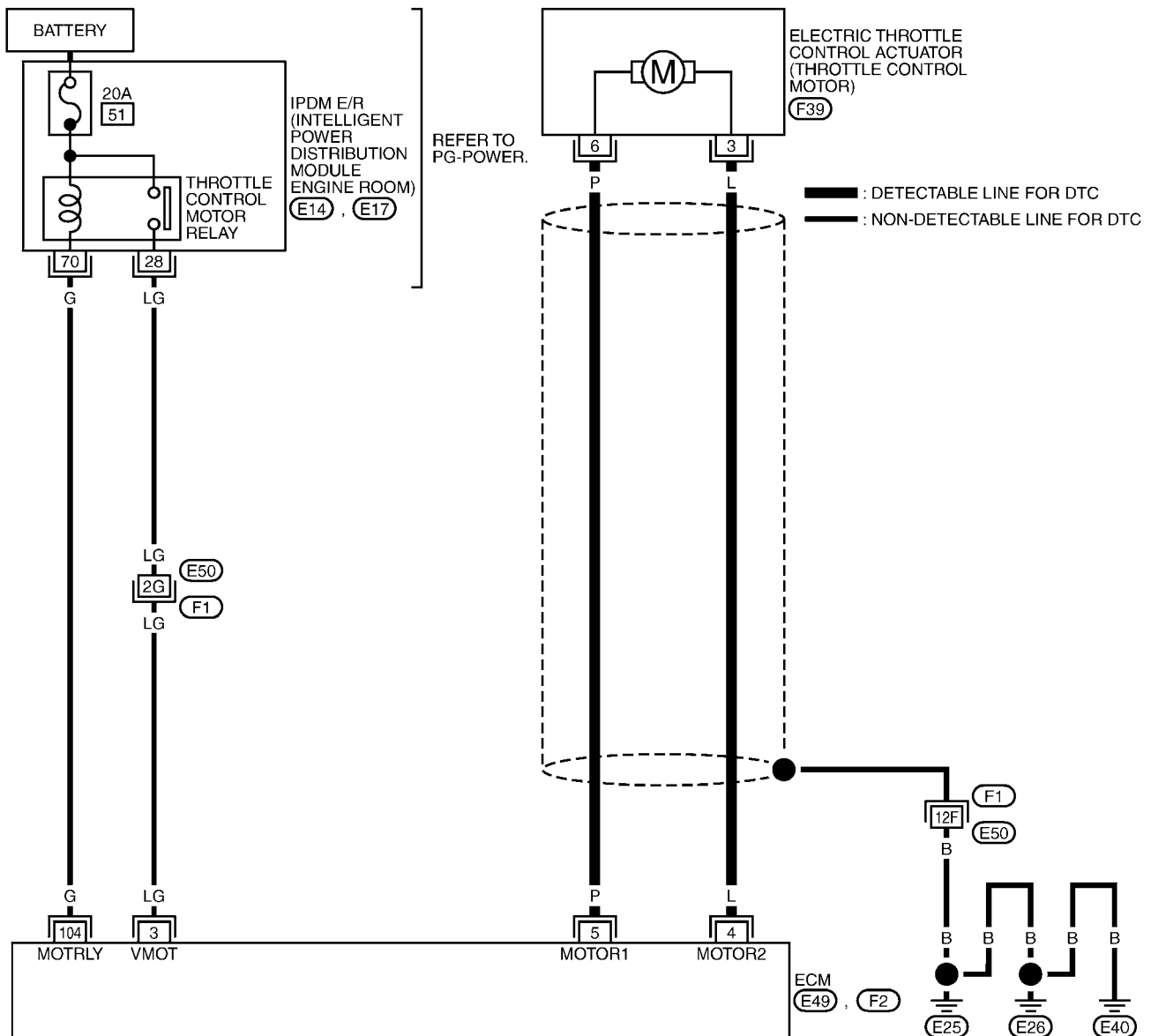
DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS0009Z

EC-ETC3-01



MBWA0288E

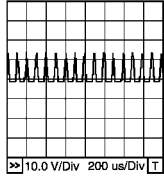
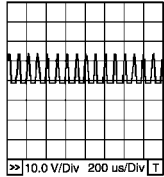
DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L	Throttle control motor (Close)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	P	Throttle control motor (Open)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

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

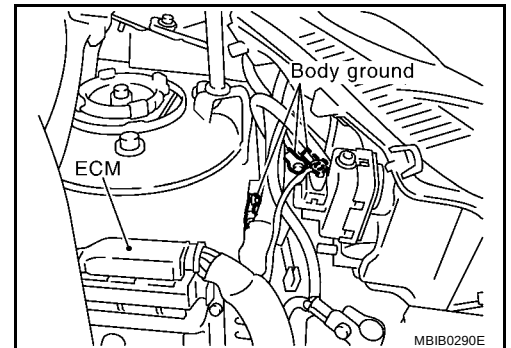
Diagnostic Procedure

EBS000A0

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



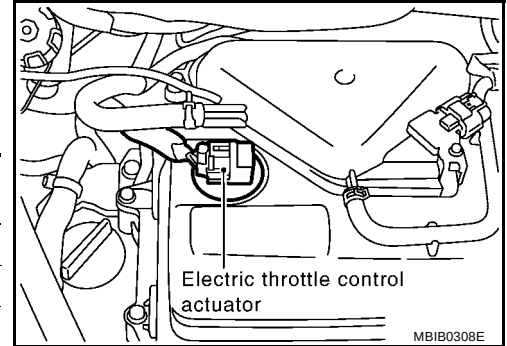
DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITH EURO-OBD)]

2. 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
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist



5. 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-292, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

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-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

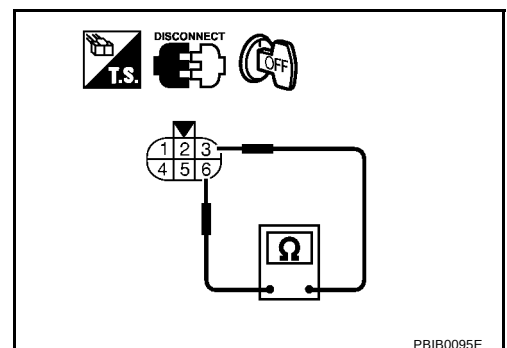
Component Inspection THROTTLE CONTROL MOTOR

EBS000A1

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 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-34, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-34, "Idle Air Volume Learning"](#) .



DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITH EURO-OBD)]

Remove and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

EBS000A2

A
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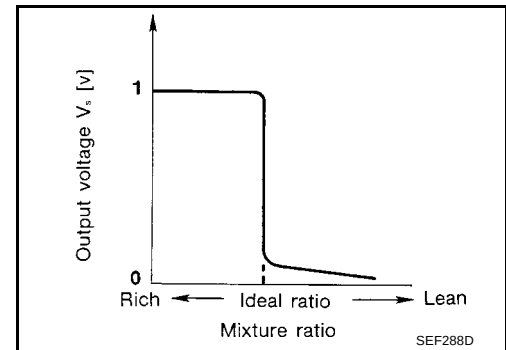
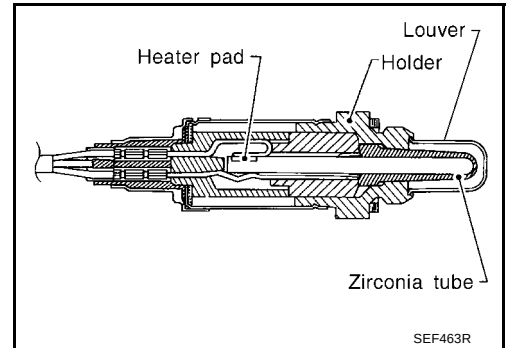
DTC P1143 HO2S1

PFP:22690

Component Description

EBS000A3

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

**CONSULT-II Reference Value in Data Monitor Mode**

EBS000A4

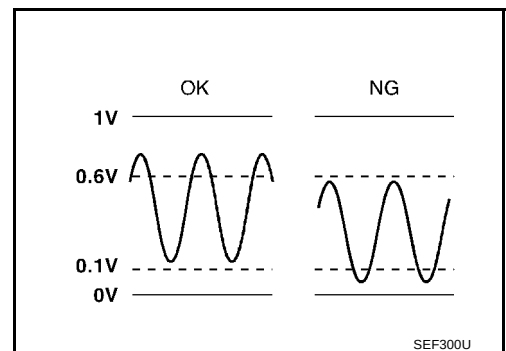
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS000A5

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

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:

- Always perform at a temperature above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1) P1143" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

HO2S1 (B1) P1143	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0546E

6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,500 - 3,350 rpm
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	1.7 - 5.1 msec
Selector lever	Suitable position

HO2S1 (B1) P1143	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0547E

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-296, "Diagnostic Procedure"](#).

HO2S1 (B1) P1143	
COMPLETED	

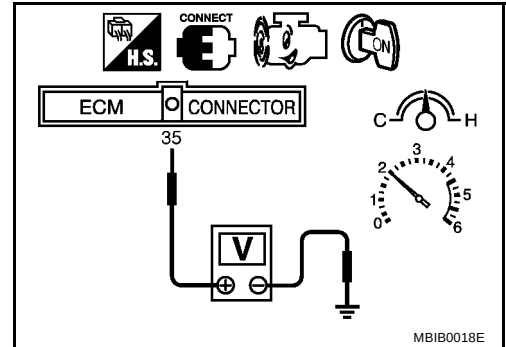
SEC769C

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
4. If NG, go to [EC-296, "Diagnostic Procedure"](#).

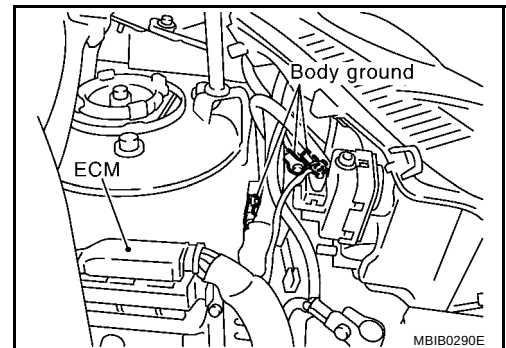


EBS000A8

Diagnostic Procedure**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

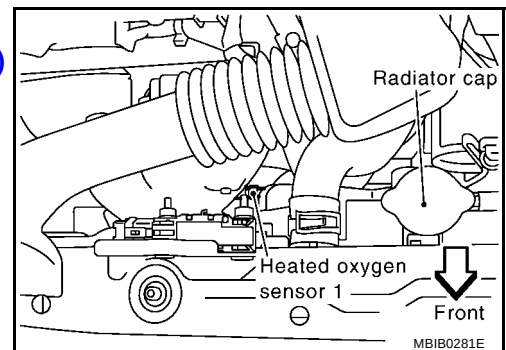
>> GO TO 2.

**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



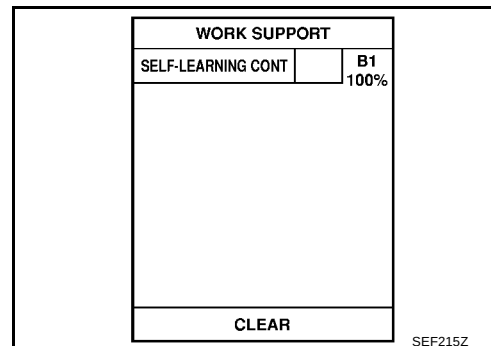
3. CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
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 detected?

Is it difficult to start engine?

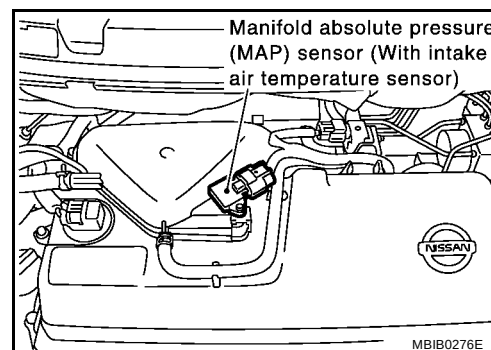


Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Make sure that DTC P0107 is displayed.
6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected?

Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171. Refer to [EC-188](#).
- No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-130, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-298, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

For circuit, refer to [EC-153, "Wiring Diagram"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

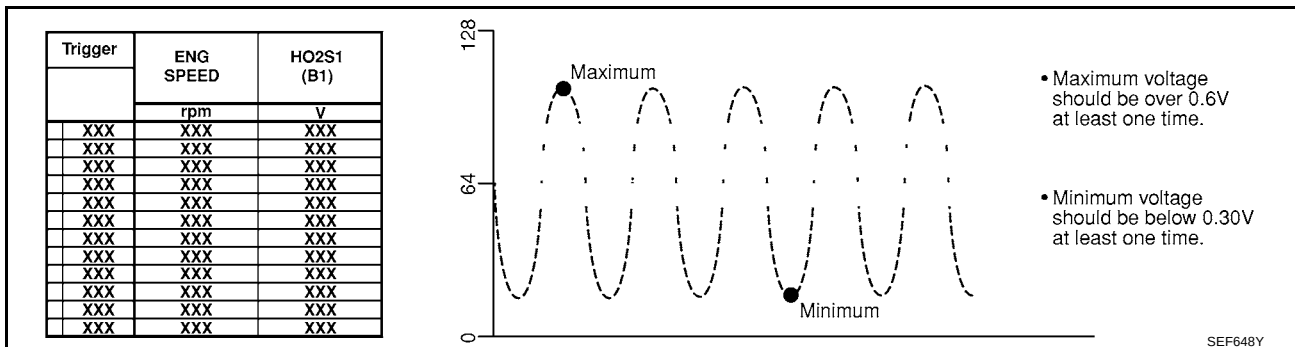
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R	L	R	L	R	L
R means HO2S1 MNTR (B1) indicates RICH						
L means HO2S1 MNTR (B1) indicates LEAN						

SEF217YA



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

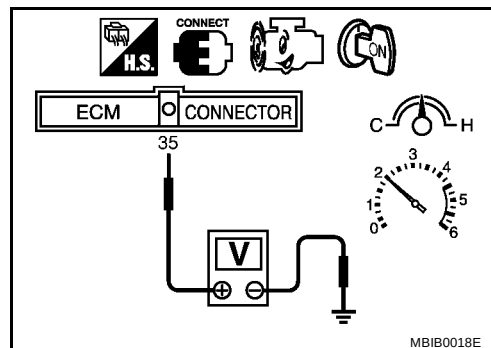
⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation

HEATED OXYGEN SENSOR 1

EBS000AA

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#).

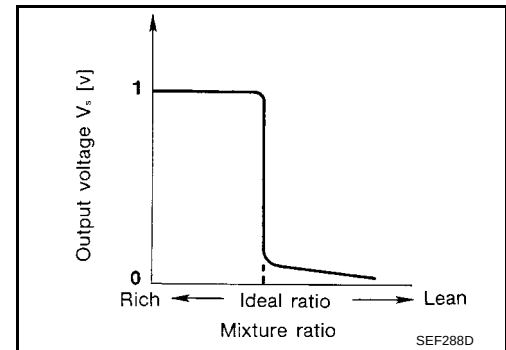
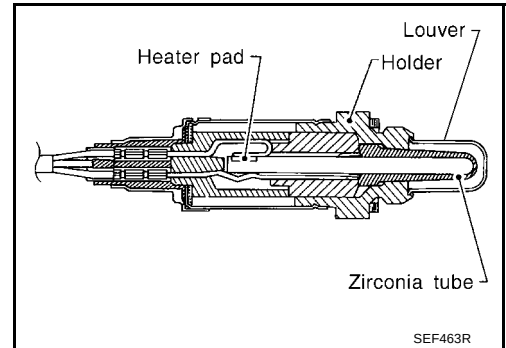
DTC P1144 HO2S1

PFP:22690

Component Description

EBS000AB

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

EBS000AC

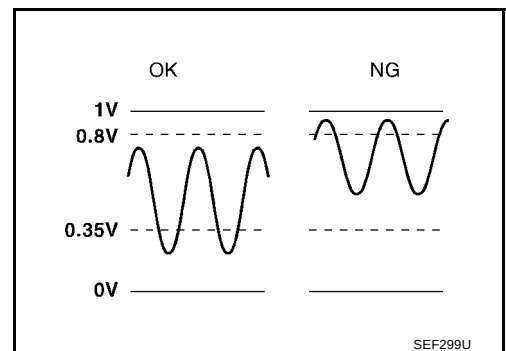
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS000AD

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high. The "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Injectors

DTC Confirmation Procedure

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:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch "ON" and select "HO2S1 (B1) P1144" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4. Touch "START".
5. Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

HO2S1 (B1) P1144	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0548E

6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,500 - 3,350 rpm
Vehicle speed	50 - 100 km/h (31 - 62 MPH)
B/FUEL SCHDL	1.7 - 5.1 msec
Selector lever	Suitable position

HO2S1 (B1) P1144	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0549E

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-302, "Diagnostic Procedure"](#).

HO2S1 (B1) P1144	
COMPLETED	

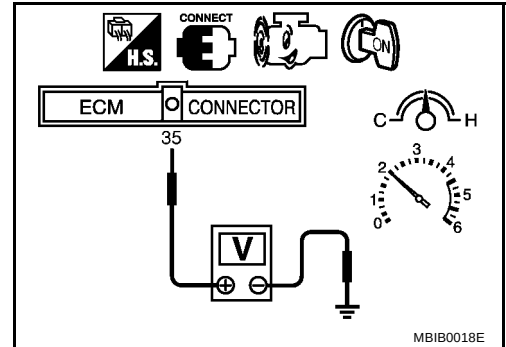
SEC772C

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
4. If NG, go to [EC-302, "Diagnostic Procedure"](#).

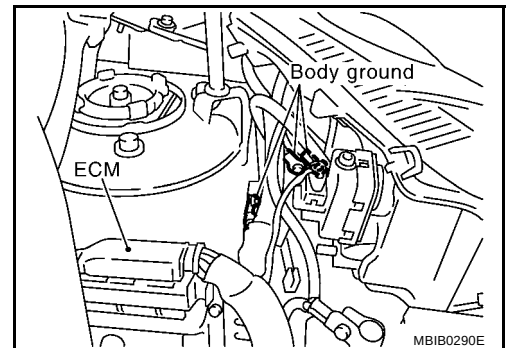


EBS000A9

Diagnostic Procedure**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

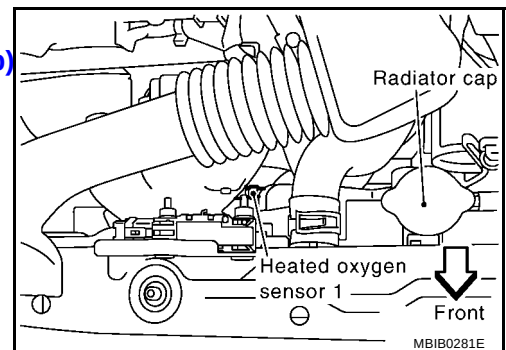
>> GO TO 2.

**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



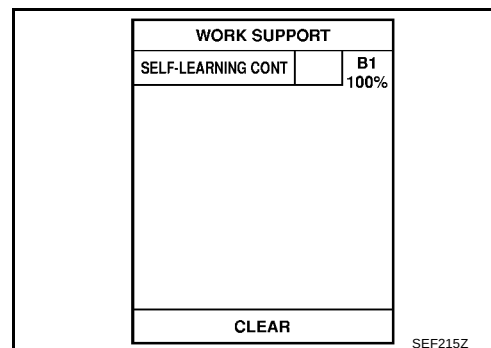
3. CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

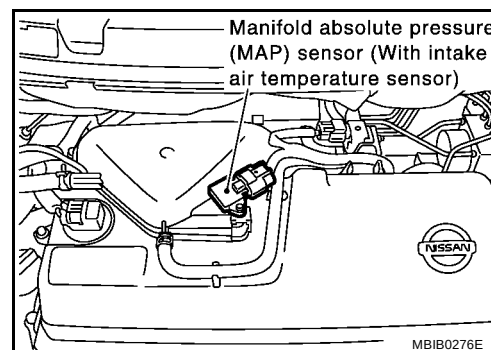
Is the 1st trip DTC P0172 detected?

Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
 2. Turn ignition switch "OFF".
 3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
 4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
 5. Make sure that DTC P0107 is displayed.
 6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
 7. Make sure that DTC P0000 is displayed.
 8. Run engine for at least 10 minutes at idle speed.
- Is the 1st trip DTC P0172 detected?**
Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0172. Refer to [EC-195](#).
 No >> GO TO 4.

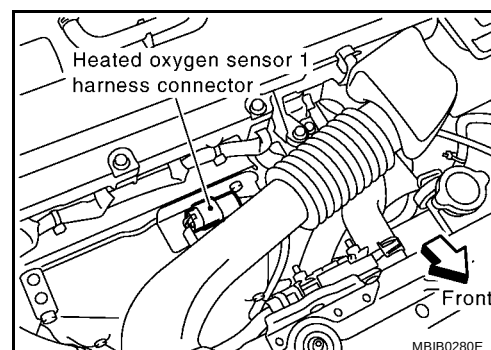
4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. 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 1 HEATER

Refer to [EC-130, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-304, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For circuit, refer to [EC-153, "Wiring Diagram"](#) .

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS000AH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

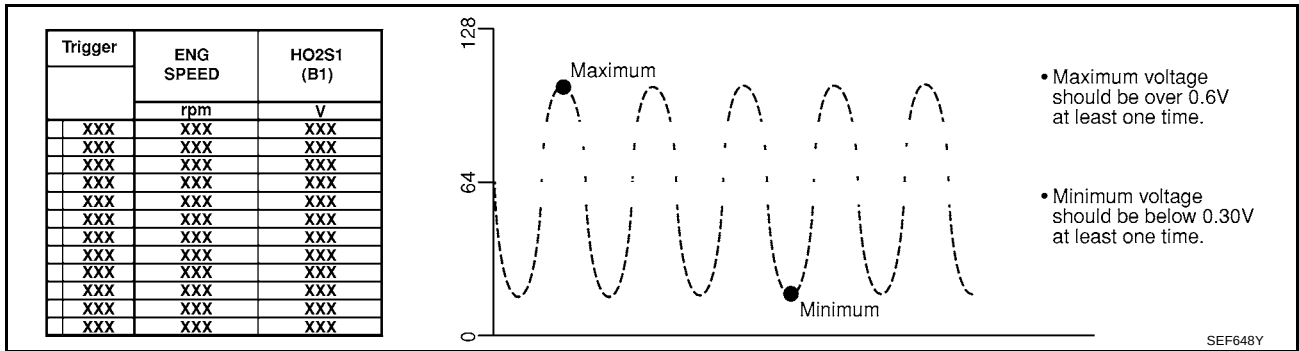
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R	L	R	L	R	L
R means HO2S1 MNTR (B1) indicates RICH L means HO2S1 MNTR (B1) indicates LEAN						

SEF217YA

**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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

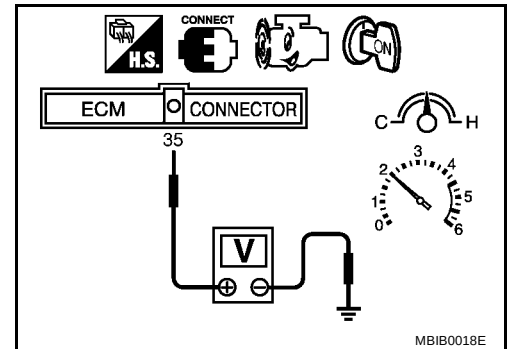
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Removal and Installation

HEATED OXYGEN SENSOR 1

EBS000AI

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#).

DTC P1146 HO2S2

PFP:226A0

Component Description

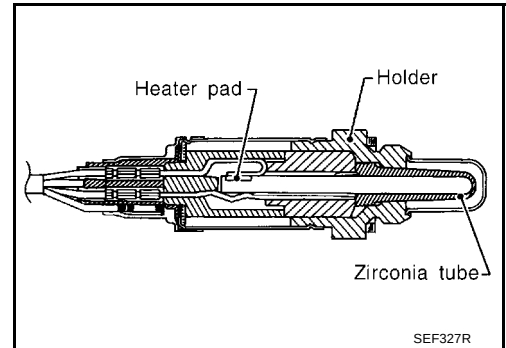
EBS000AJ

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 heated oxygen 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-II Reference Value in Data Monitor Mode**

EBS000AK

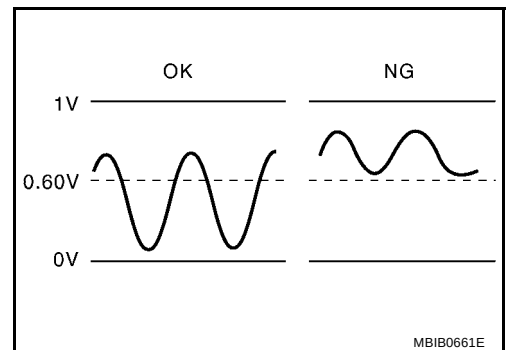
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		LEAN $\longleftrightarrow$ RICH

On Board Diagnosis Logic

EBS000AL

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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	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 - Injectors

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT-II 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-II**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 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 one minute under no load.
4. Let engine idle one minute.
5. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
If “COMPLETED” appears on CONSULT-II screen, go to step 2 in Procedure for COND3”.
If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,500 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position

HO2S2 (B1) P1146	HO2S2 (B1) P1146	HO2S2 (B1) P1146
COND1: OUT OF CONDITION	COND1: TESTING	COND1: COMPLETED
COND2: INCOMPLETE	COND2: INCOMPLETE	COND2: INCOMPLETE
COND3: INCOMPLETE	COND3: INCOMPLETE	COND3: INCOMPLETE
MONITOR	MONITOR	MONITOR
ENG SPEED XXX rpm	ENG SPEED XXX rpm	ENG SPEED XXX rpm
B/FUEL SCHDL XXX msec	B/FUEL SCHDL XXX msec	B/FUEL SCHDL XXX msec

PBIB0555E

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-II 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 from the above condition [step 9] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED" (It will take approximately 4 seconds.)

NOTE:

If "COMPLETE" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

HO2S2 (B1) P1146	
COND1:	COMPLETED
COND2:	COMPLETED
COND3:	INCOMPLETE
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

PBIB0556E

Procedure for COND3

1. Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II 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-310, "Diagnostic Procedure"](#).
If "CAN NOT BE DIAGNOSED" is displayed, performed 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 "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
 - c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
 - d. When "COOLANTEMP/S" indication reaches to 70°C(158°F), go to procedure for COND1 step 3.

HO2S2 (B1) P1146
COMPLETED
SELF-DIAG RESULTS

SEC775C

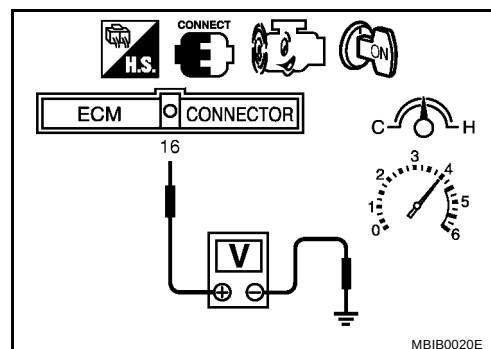
Overall Function Check

EBS000AN

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

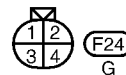
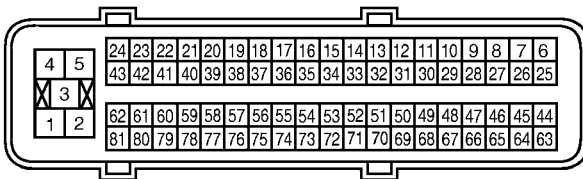
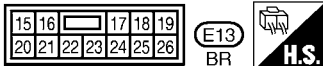
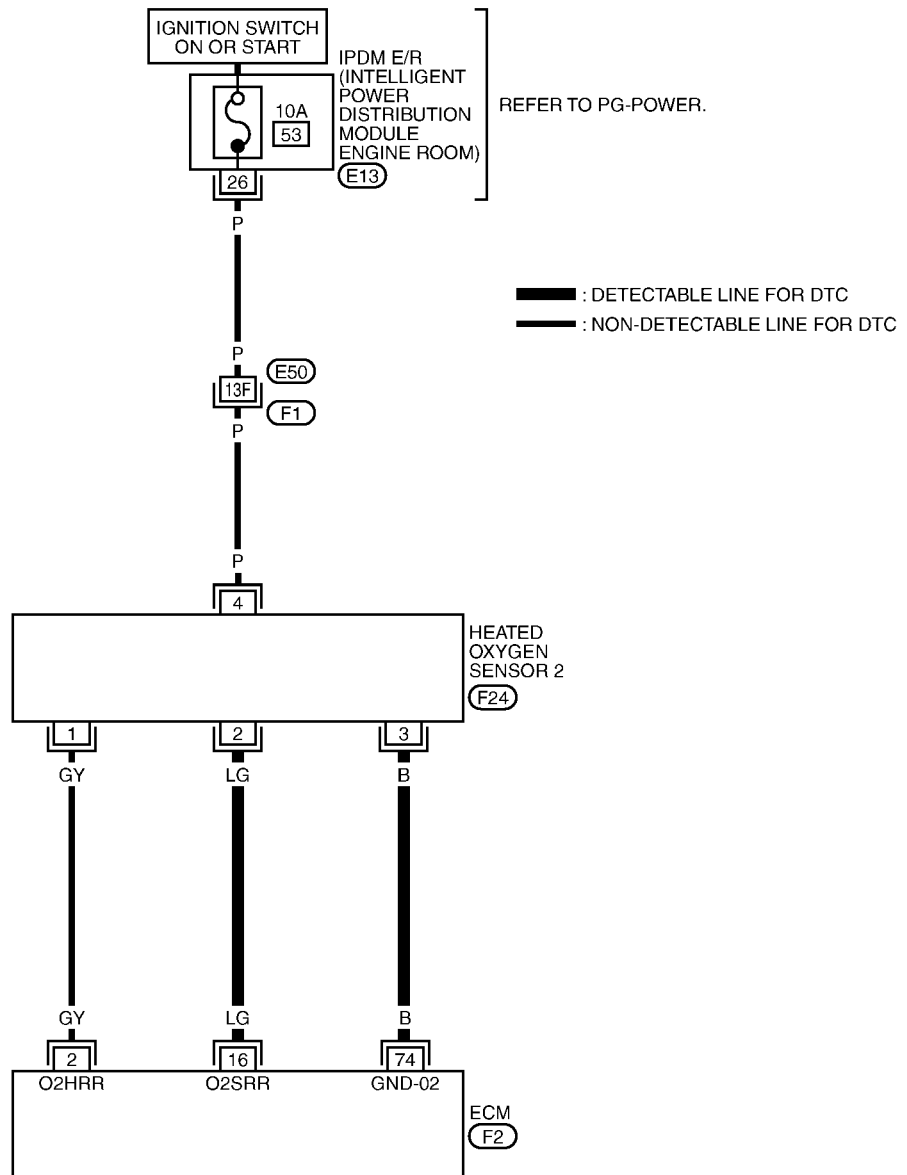
1. Start engine and warm it up to the operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 0.60V 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 (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V at least once during this procedure.
8. If NG, go to [EC-310, "Diagnostic Procedure"](#).



Wiring Diagram

EBS000AO

EC-HO2S2-01



REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 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 one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

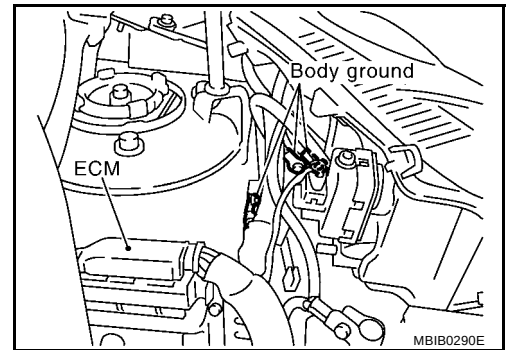
Diagnostic Procedure

EBS000AP

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

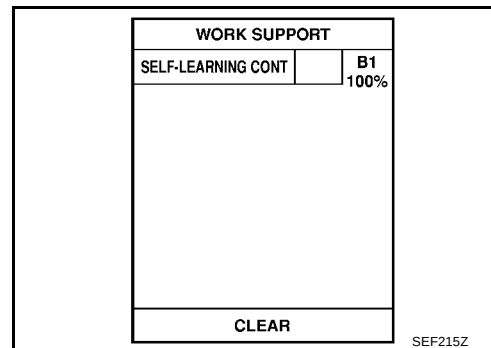
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

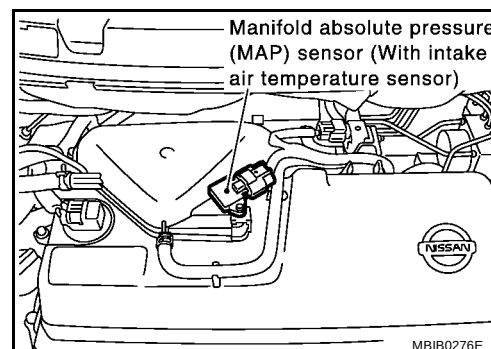
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
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 detected?
Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Make sure that DTC P0107 is displayed.
6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 detected?
Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0172. Refer to [EC-195](#).
- No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

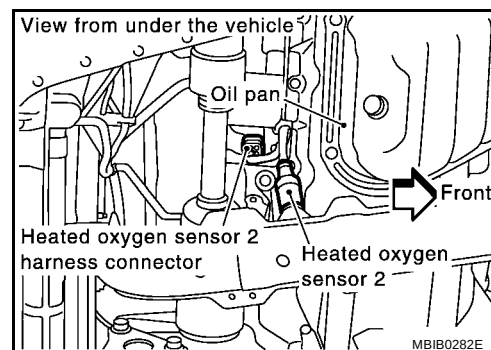
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

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 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. 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-312, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS000AQ

With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

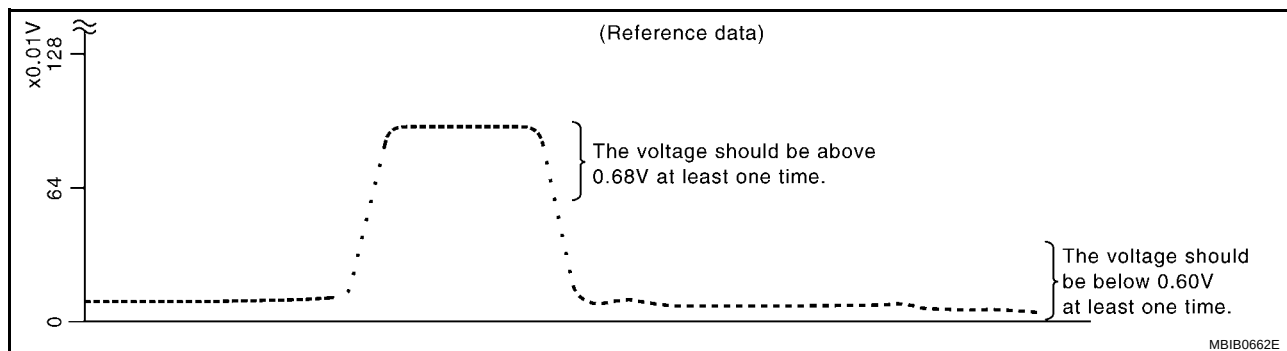
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

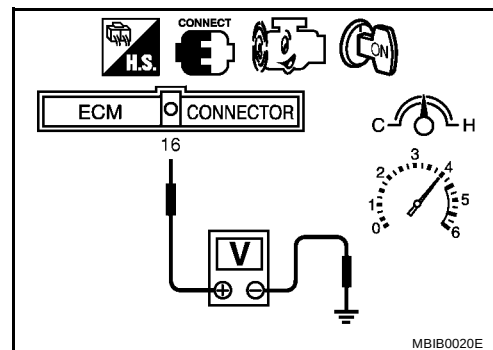
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ **Without CONSULT-II**

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

EBS000AR

DTC P1147 HO2S2

PFP:226A0

Component Description

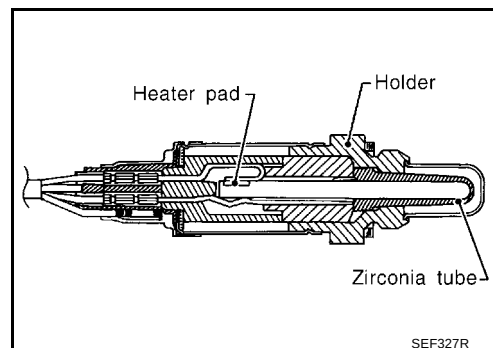
EBS00OAS

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 heated oxygen 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-II Reference Value in Data Monitor Mode**

EBS00OAT

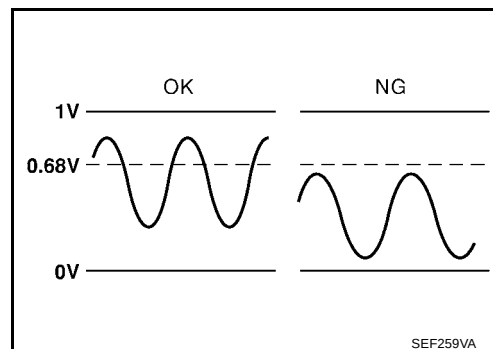
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		LEAN $\longleftrightarrow$ RICH

On Board Diagnosis Logic

EBS00OAU

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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	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 open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT-II 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-II**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 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 one minute under no load.
4. Let engine idle one minute.
5. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
If “COMPLETED” appears on CONSULT-II screen, go to step 2 in “Procedure for COND3”.
If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, “TESTING” will be displayed at COND1” on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

ENG SPEED	More than 1,500 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position

HO2S2 (B1) P1147	HO2S2 (B1) P1147	HO2S2 (B1) P1147
COND1: OUT OF CONDITION	COND1: TESTING	COND1: COMPLETED
COND2: INCOMPLETE	COND2: INCOMPLETE	COND2: INCOMPLETE
COND3: INCOMPLETE	COND3: INCOMPLETE	COND3: INCOMPLETE
MONITOR	MONITOR	MONITOR
ENG SPEED XXX rpm B/FUEL SCHDL XXX msec	ENG SPEED XXX rpm B/FUEL SCHDL XXX msec	ENG SPEED XXX rpm B/FUEL SCHDL XXX msec

PBIB0557E

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-II 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 from the above condition [step 9] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED" (It will take approximately 4 seconds.)

NOTE:

If "COMPLETE" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

HO2S2 (B1) P1147	
COND1:	COMPLETED
COND2:	COMPLETED
COND3:	INCOMPLETE
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

PBIB0558E

Procedure for COND3

1. Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II 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-318, "Diagnostic 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-II.
 - c. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
 - d. When "COOLAN TEMP/S" indication reaches to 70°C(158°F), go to procedure for COND1 step 3.

HO2S2 (B1) P1147
COMPLETED
SELF-DIAG RESULTS

SEC778C

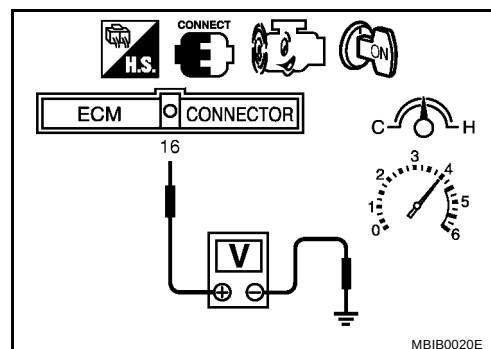
Overall Function Check

EBS000AW

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

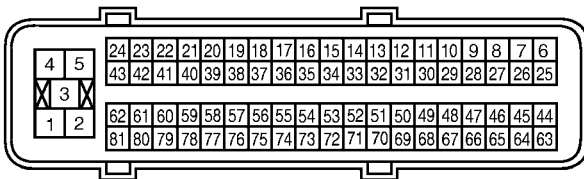
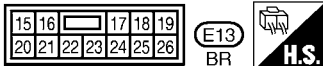
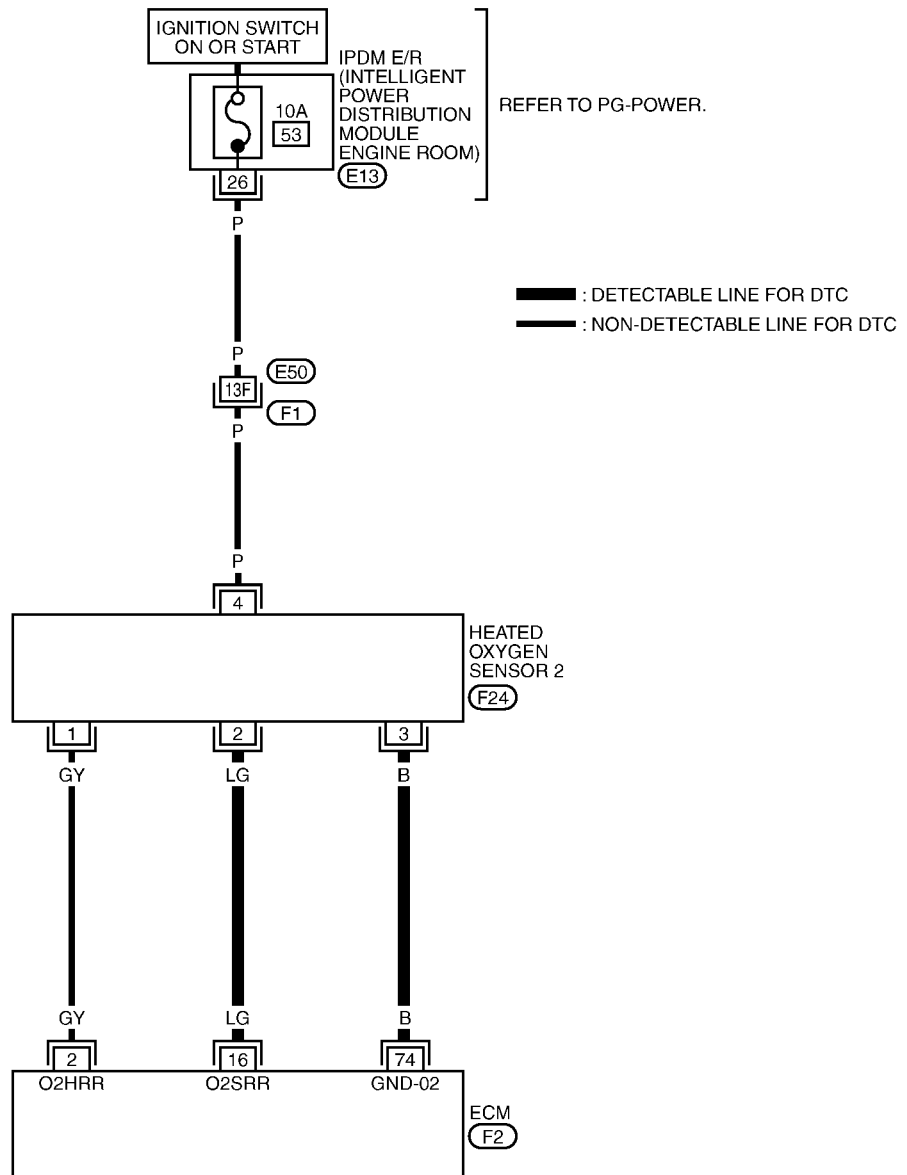
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to [EC-318, "Diagnostic Procedure"](#).



Wiring Diagram

EBS000AAX

EC-HO2S2-01



REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 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 one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

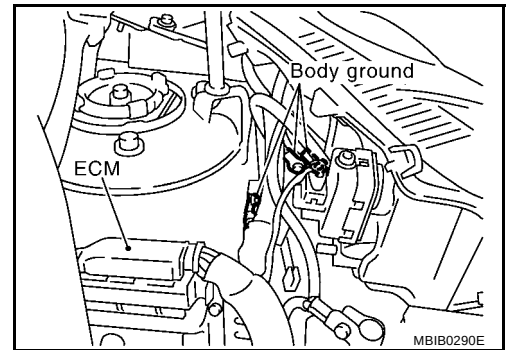
Diagnostic Procedure

EBS000AY

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

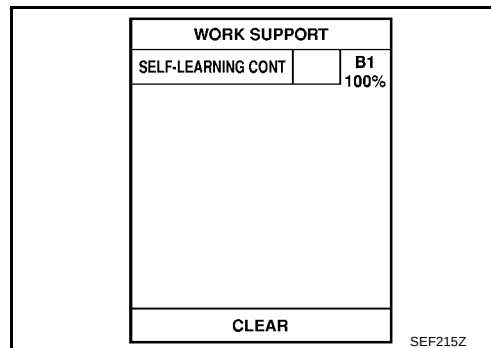
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

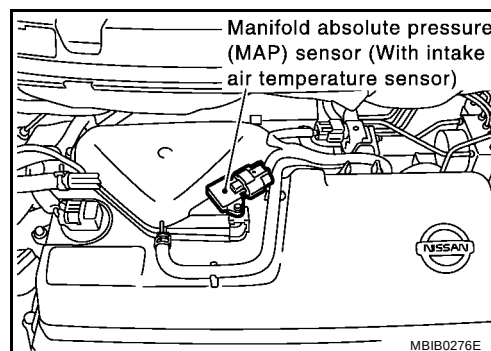
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
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 detected?
Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect manifold absolute pressure sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect manifold absolute pressure sensor harness connector.
5. Make sure that DTC P0107 is displayed.
6. Erase the DTC memory. Refer to [EC-51, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected?
Is it difficult to start engine?



Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171. Refer to [EC-188](#).
- No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

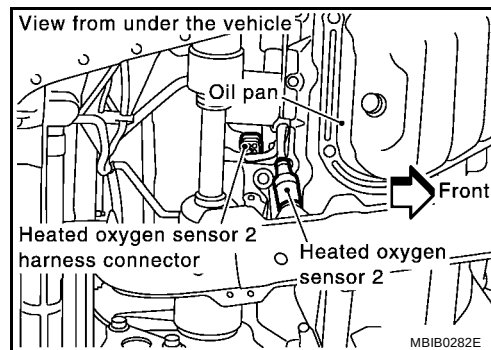
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

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 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. 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-320, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS000AZ

④ With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

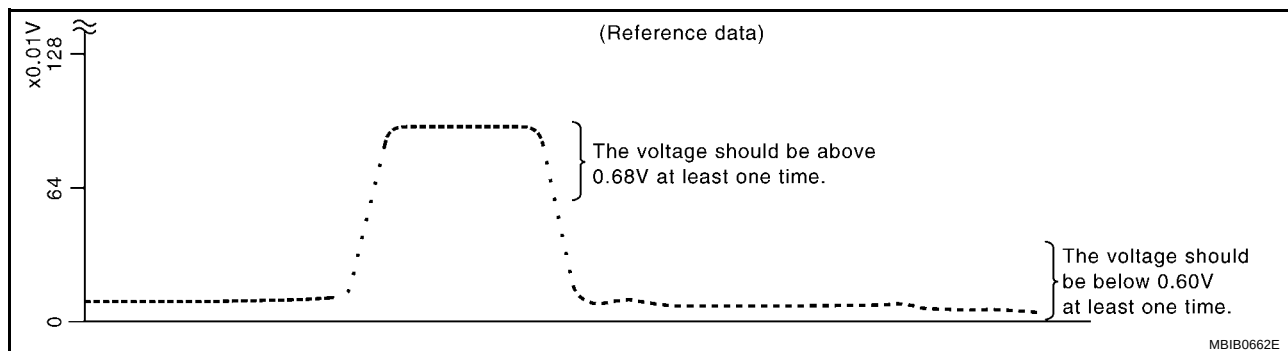
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

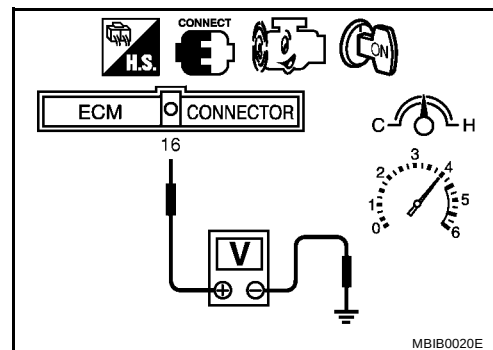
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Removal and Installation
HEATED OXYGEN SENSOR 2**

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

EBS000B0

DTC P1171 INTAKE ERROR

PFP:22365

On Board Diagnosis Logic

EBS00050

NOTE:

If DTC 1171 is displayed with DTC P0108, first perform the trouble diagnosis for DTC P0108.

Refer to [EC-138](#)

ECM computes two intake air volume values.

1: Computed from manifold absolute pressure signal and intake air temperature signal.

2: Computed from engine revolution signal and throttle position signal.

In normal condition, value 1 is used for engine control.

If intake air leak occurred between throttle valve and intake air port, manifold absolute pressure sensor signal might increase, and then ECM increases amount of fuel injected. In this case, ECM uses value 2 for engine control instead of value1.

ECM monitors the difference between value 1 and value 2. If the difference is extremely large, ECM judges intake air leak occurs and light up the MI

This diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1171 1171	Intake error	An excessively high voltage from manifold absolute pressure sensor is sent to ECM.	● Harness or connectors (The manifold absolute pressure sensor circuit is open or shorted.) ● Manifold absolute pressure ● Intake air leaks ● Vacuum hoses

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Intake air system problem	When accelerator pedal is depressed, engine speed will not rise more than 2,500 rpm due to fuel cut.

DTC Confirmation Procedure

EBS0005P

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to [EC-324, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

DTC P1171 INTAKE ERROR

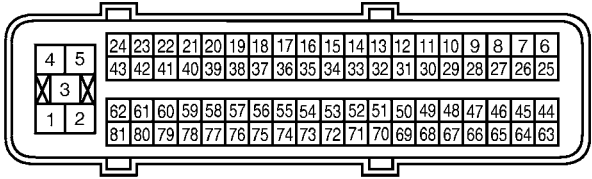
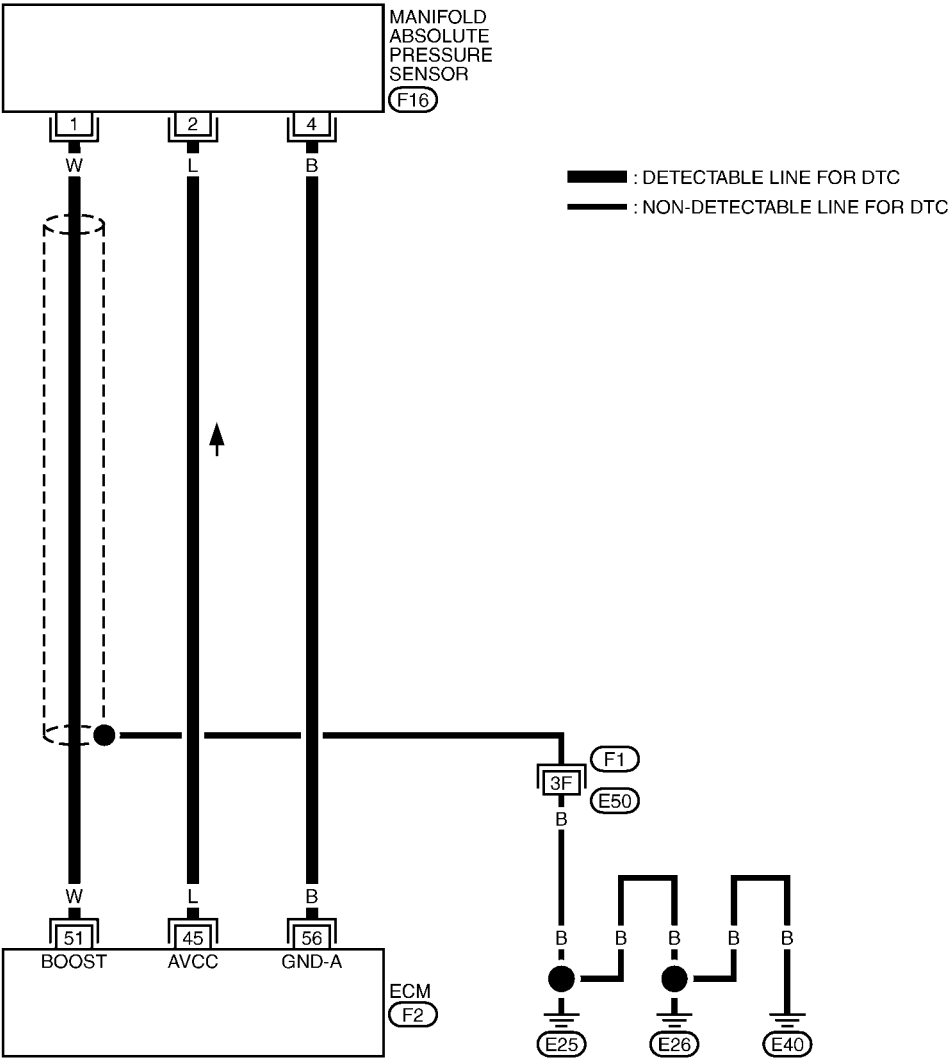
[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000SQ

EC-AP/SEN-01

A
EC
C
D
E
F
G
H
I
J
K
L
M



F2



4 3 2 1 (F16) GY

REFER TO THE FOLLOWING.
(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1171 INTAKE ERROR

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V

Diagnostic Procedure

EBS000SR

1. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the air cleaner element.

OK or NG

OK >> GO TO 2.

NG >> Repair or replace.

2. CHECK VACUUM HOSE

1. Check intake manifold vacuum hoses for clogging or disconnection. Refer to [EC-22, "Vacuum Hose Drawing"](#).

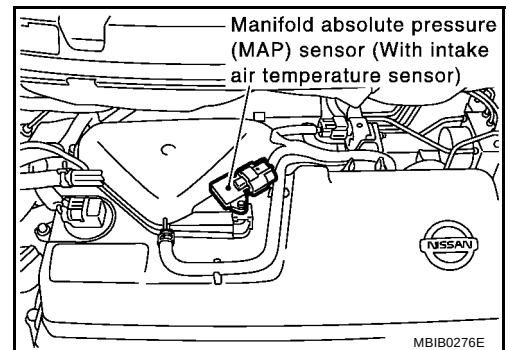
OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect manifold absolute pressure sensor harness connector.
3. Turn ignition switch "ON".



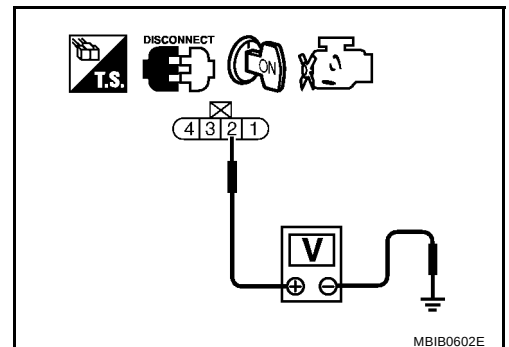
4. Check voltage between manifold absolute pressure sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.

NG >> Repair harness or connectors.



4. CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between manifold absolute pressure sensor terminal 4 and ECM terminal 56.
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 harness or connectors.

5. CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between manifold absolute pressure sensor terminal 1 and ECM terminal 51.

Continuity should exist.

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

OK or NG

- OK >> GO TO 6.
NG >> Repair harness or connectors.

6. CHECK MAP SENSOR

Refer to [EC-139, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 7.
NG >> Repair or replace sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

DTC P1217 ENGINE OVER TEMPERATURE

PF0:00000

System Description

EBS000B1

NOTE:

If DTC P1217 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-120, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

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 relay)
Battery	Battery voltage*1		
Vehicle speed signal	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch*3	Air conditioner "ON" signal*2		
Refrigerant pressure sensor*3	Refrigerant pressure		

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

*2: These signals are sent to ECM through CAN communication line.

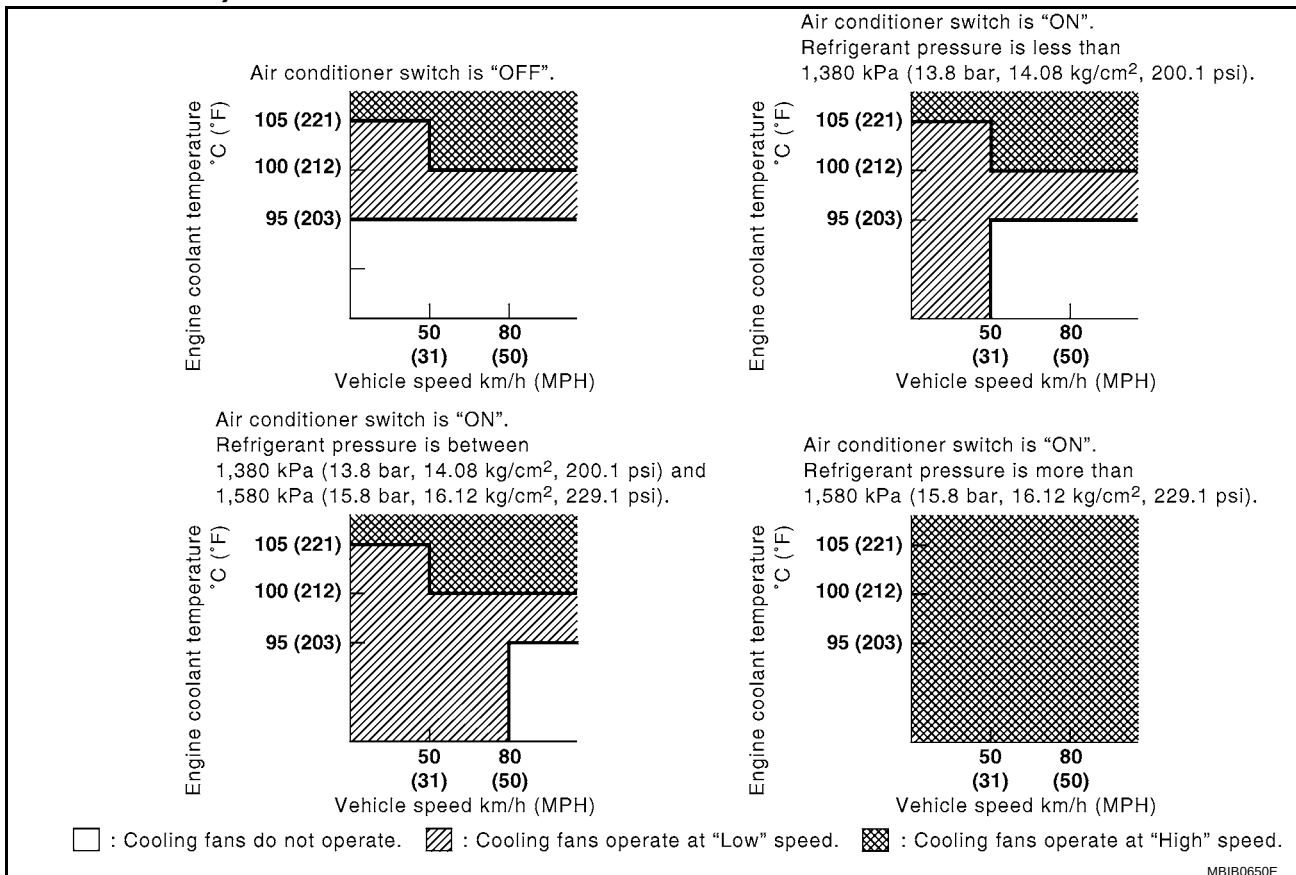
*3: Models with air conditioner.

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] (models with A/C) or 2 step control [ON/OFF] (models without A/T).

The ECM controls cooling fan relays through CAN communication line.

OPERATION

(Models with A/C)

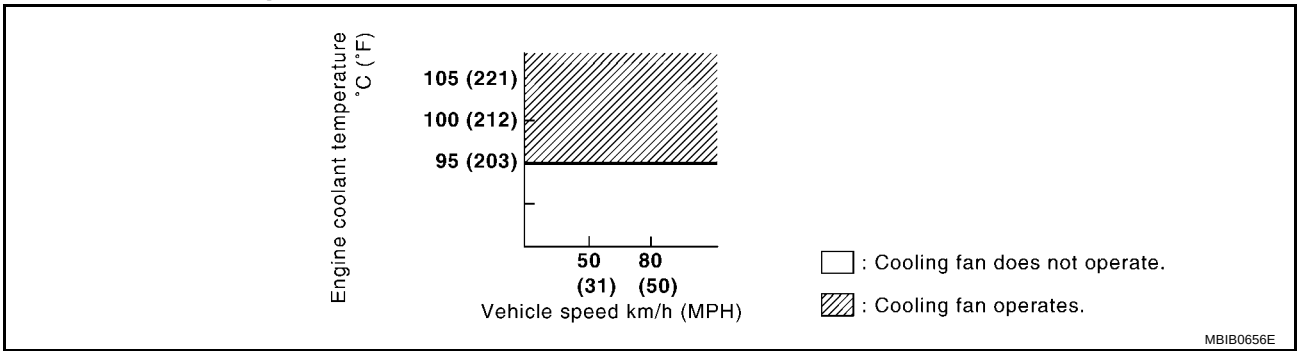


MB1B0650E

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

(Models without A/C)



A

EC

C

D

E

F

G

H

I

J

K

L

M

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

CONSULT-II Reference Value in Data Monitor Mode

EBS000B2

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	(Models with A/C) - Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (210°F)	LOW*
		Engine coolant temperature is 105°C (212°F) or more	HI*

*:Models without air conditioner, cooling fan operates only ON and OFF operation, but CONSULT-II display will change OFF, LOW and HI depends on engine coolant temperature.

On Board Diagnosis Logic

EBS000B3

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 was not added to the system using the proper filling method.	- Harness or connectors (The cooling fan circuit is open or shorted.) - Cooling fan - Radiator hose - Radiator - Radiator cap - Water pump - Thermostat For more information, refer to EC-340, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-7, "Changing Engine coolant"](#) . Also, replace the engine oil. Refer to [LU-5, "Changing Engine Oil"](#) .

1. 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-13, "Engine Coolant Mixture Ratio"](#) .
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

EBS000B4

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

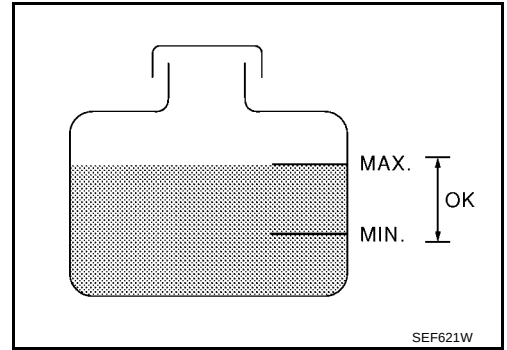
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

WITH CONSULT-II

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-333, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-333, "Diagnostic Procedure"](#).
3. Turn ignition switch "ON".
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
5. If the results are NG, go to [EC-333, "Diagnostic Procedure"](#).

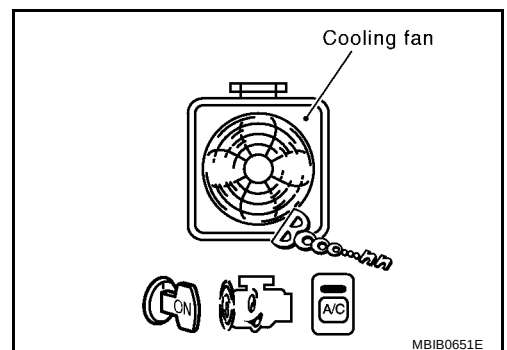
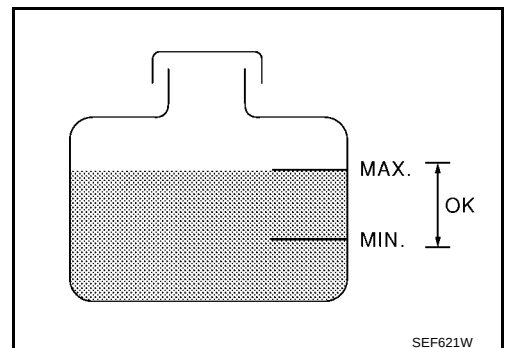


ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLANT TEMP/S	XXX °C

WITH GST

(Models with air conditioner)

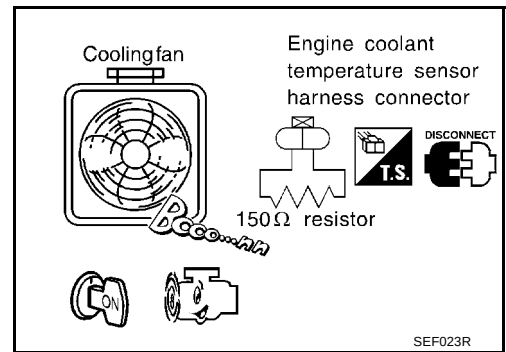
1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-333, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-333, "Diagnostic Procedure"](#).
3. Start engine.
Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch "ON".
6. Turn blower fan switch "ON".
7. Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
If NG, go to [EC-333, "Diagnostic Procedure"](#).
If OK, go to the following step.
9. Turn ignition switch "OFF".
10. Turn air conditioner switch and blower fan switch "OFF".
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



DTC P1217 ENGINE OVER TEMPERATURE

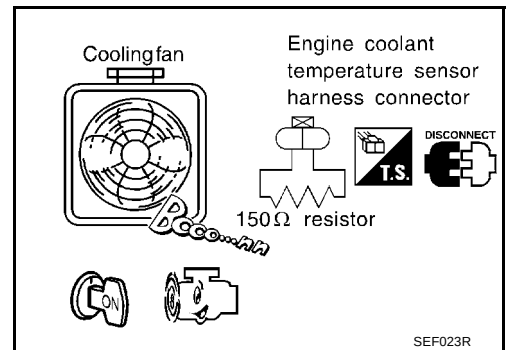
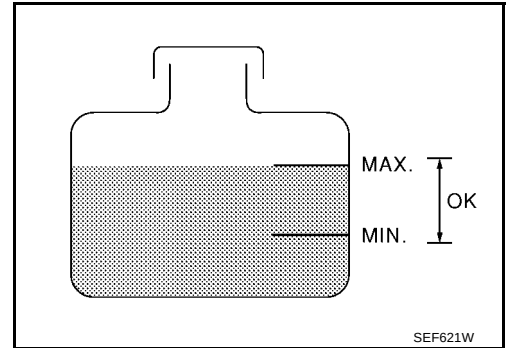
[CR (WITH EURO-OBD)]

13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14. If NG, go to [EC-333, "Diagnostic Procedure"](#).



(Models without air conditioner)

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-333, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-333, "Diagnostic Procedure"](#).
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Start engine and make that cooling fan operates. Be careful not to overheat engine.
6. If NG, go to [EC-333, "Diagnostic Procedure"](#).



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

Wiring Diagram WITH AIR CONDITIONER

EBS000B5

EC-COOL/F-01

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

A

EC

C

D

E

F

G

H

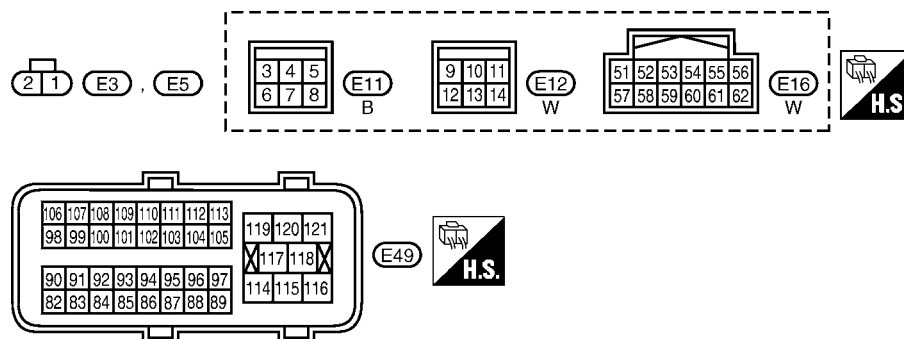
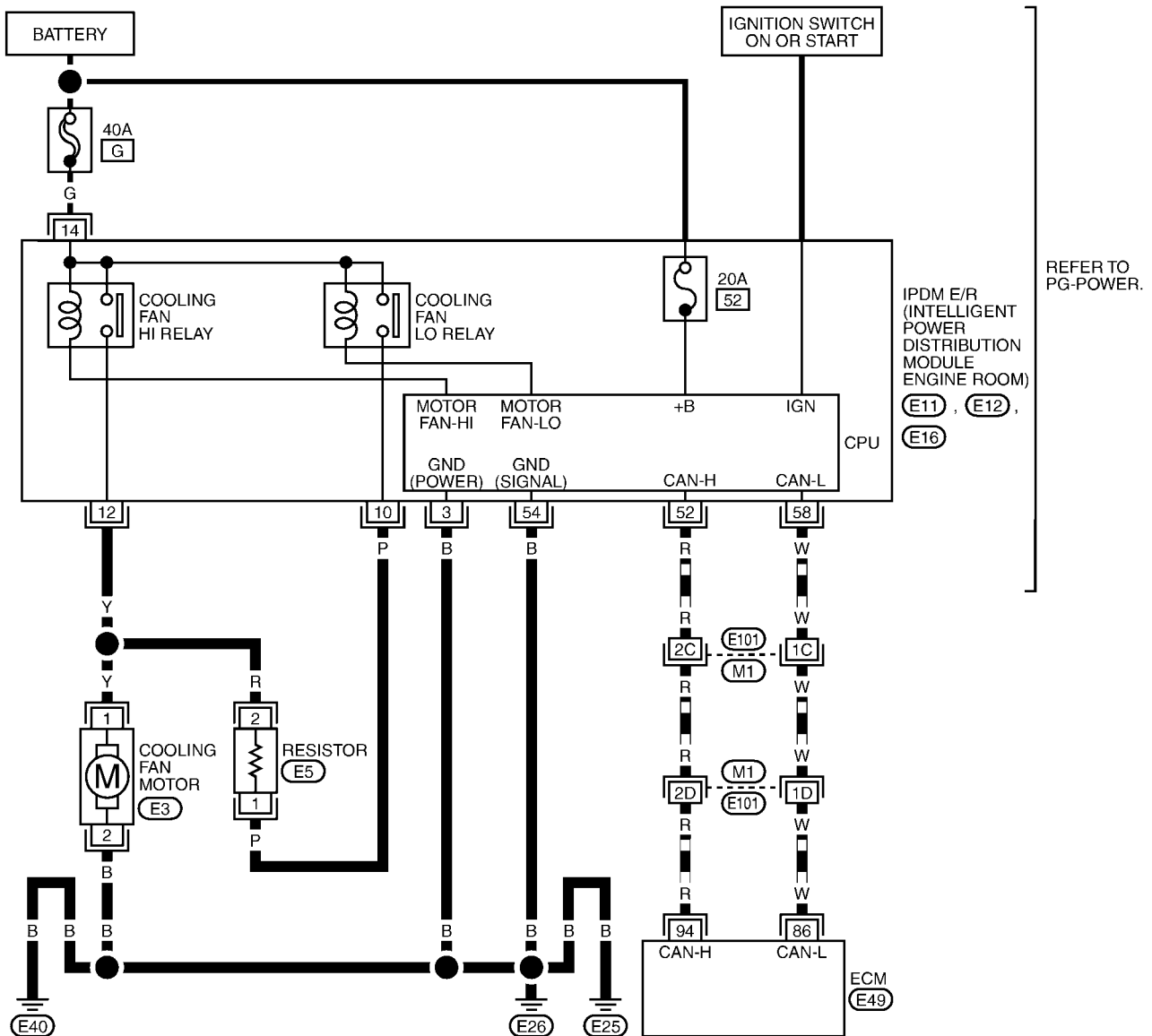
I

J

K

L

M



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0289E

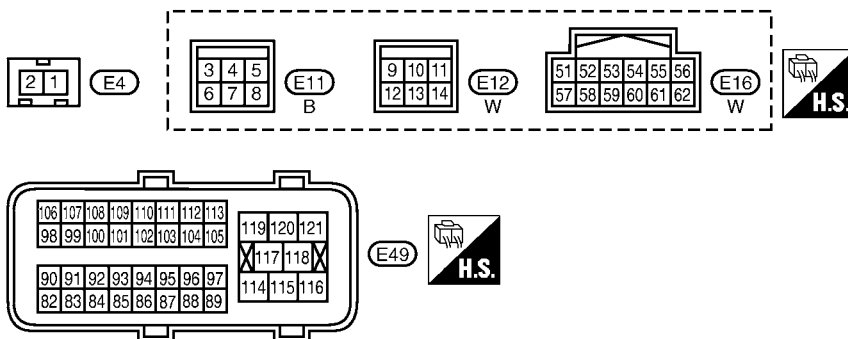
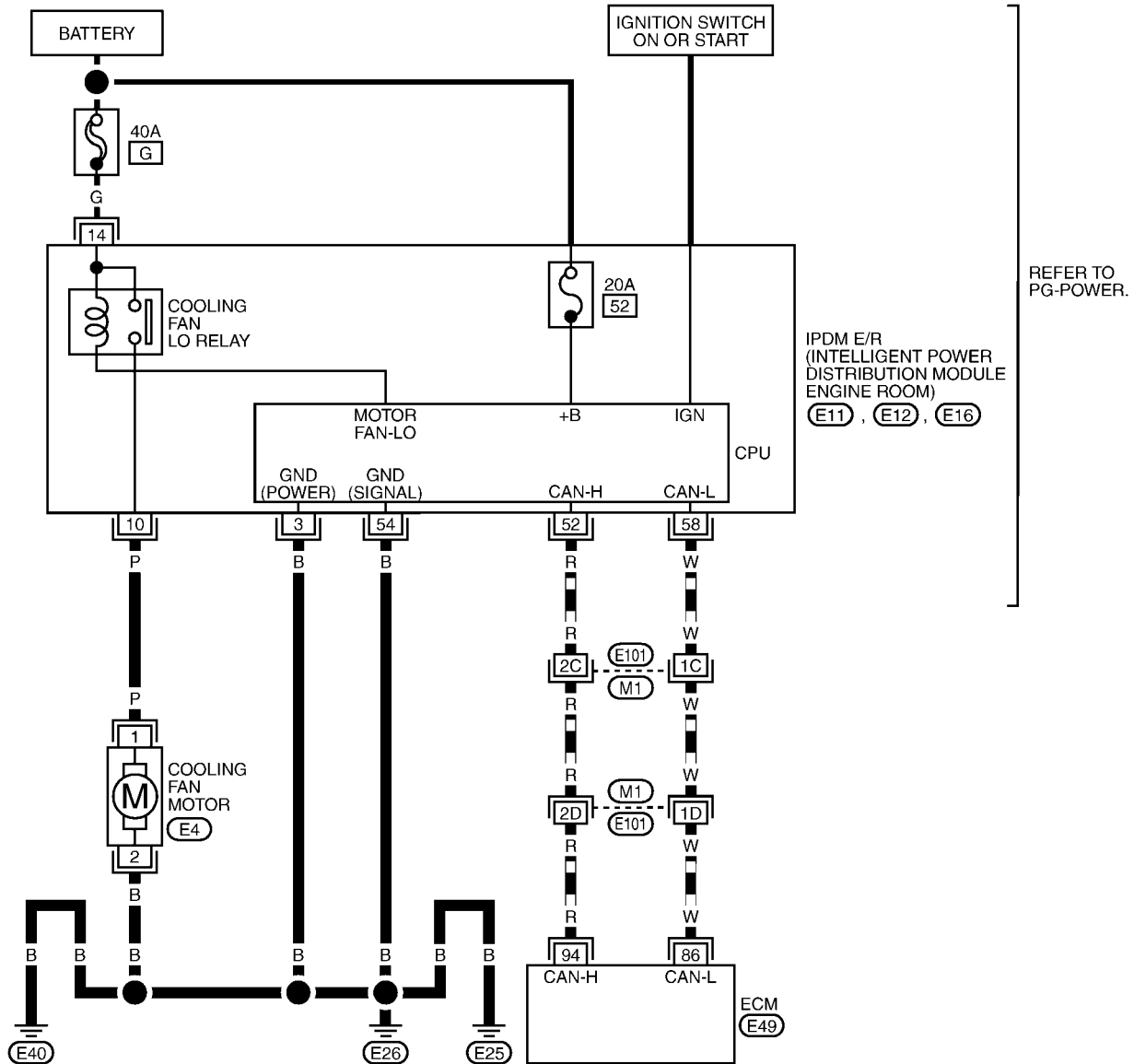
DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

WITHOUT AIR CONDITIONER

EC-COOL/F-02

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



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

EBS000B6

Diagnostic Procedure

PROCEDURE FOR MODELS WITH AIR CONDITIONER

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and touch "LOW" on the CONSULT-II screen.
3. Make sure that cooling fan operates at low speed.

OK or NG

OK >> GO TO 3.

NG >> Check cooling fan low speed control circuit. (Go to [EC-338, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch "HIGH" on the CONSULT-II screen.
2. Make sure that cooling fan operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to [EC-338, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

4. CHECK COOLING FAN LOW SPEED OPERATION

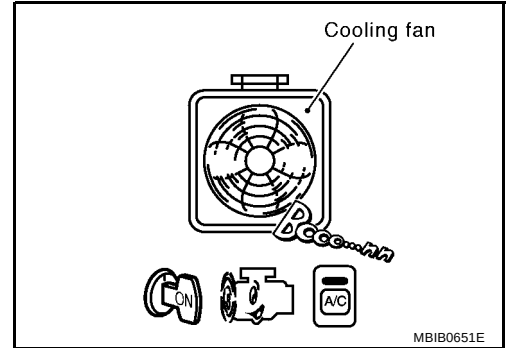
⊗ Without CONSULT-II

1. Start engine and let it idle.
2. Turn air conditioner switch "ON".
3. Turn blower fan switch "ON".
4. Make sure that cooling fan operates at low speed.

OK or NG

OK >> GO TO 5.

NG >> Check cooling fan low speed control circuit. (Go to [EC-338, "PROCEDURE A"](#).)



5. CHECK COOLING FAN HIGH SPEED OPERATION

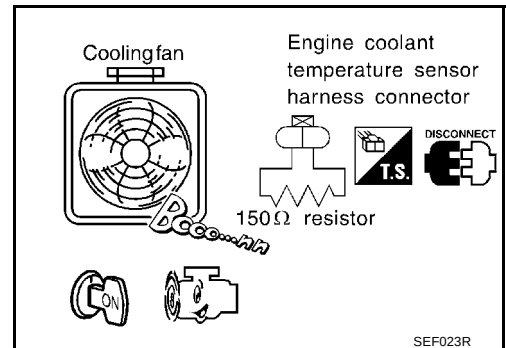
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Turn air conditioner switch and blower fan switch "OFF".
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to [EC-338, "PROCEDURE A"](#).)



6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm² , 23psi)

CAUTION:

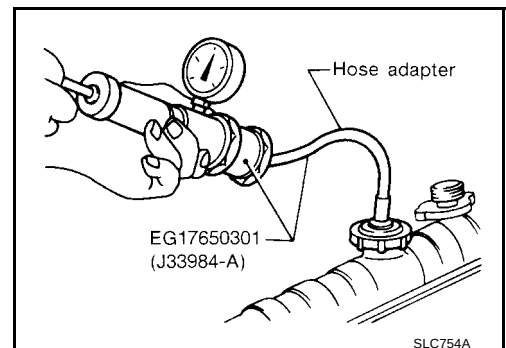
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to [CO-20, "WATER PUMP"](#) .)

>> Repair or replace.

8. CHECK RADIATOR CAP

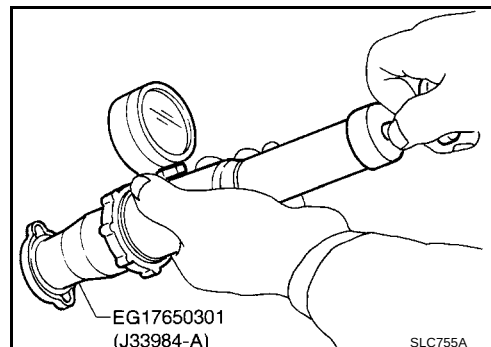
Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm² , 9 - 14 psi)

OK or NG

- OK >> GO TO 9.
NG >> Replace radiator cap.



9. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

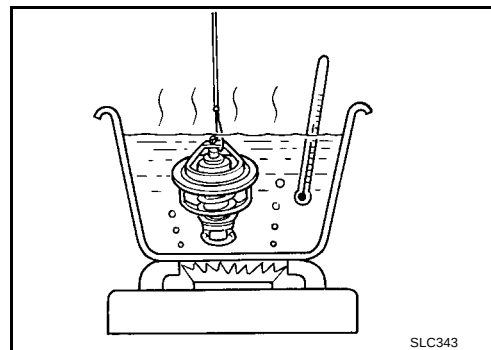
Valve lift:

More than 8 mm/95 °C (0.31 in/203 °F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to [CO-22, "THERMOSTAT"](#) .

OK or NG

- OK >> GO TO 10.
NG >> Replace thermostat.



10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-150, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-340, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

PROCEDURE FOR MODELS WITHOUT AIR CONDITIONER

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK COOLING FAN OPERATION

⑧ With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and touch "ON" on the CONSULT-II screen.
3. Make sure that cooling fan operates.

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan low speed control circuit. (Go to [EC-338, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLANT TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN OPERATION

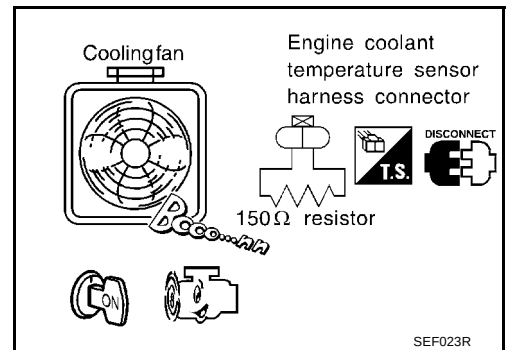
⑧ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Restart engine and make sure that cooling fan operates.

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan high speed control circuit-1. (Go to [EC-338, "PROCEDURE A"](#).)



4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm², 23psi)

CAUTION:

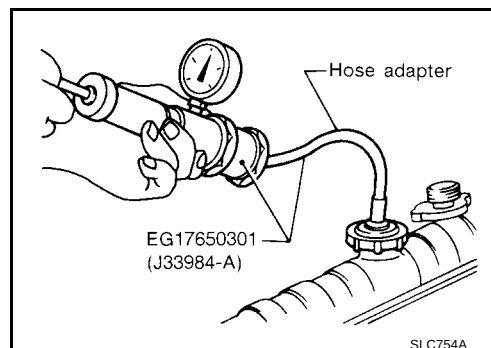
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to [CO-20, "WATER PUMP"](#).)

>> Repair or replace.

6. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

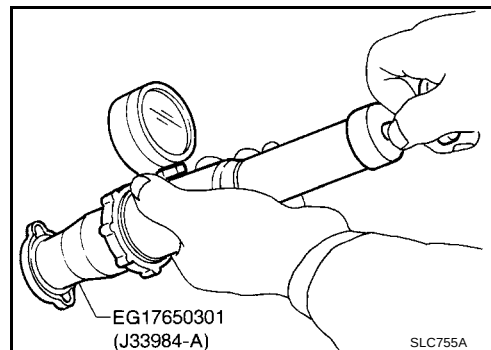
Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm², 9 - 14 psi)

OK or NG

OK >> GO TO 7.

NG >> Replace radiator cap.



7. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

Valve lift:

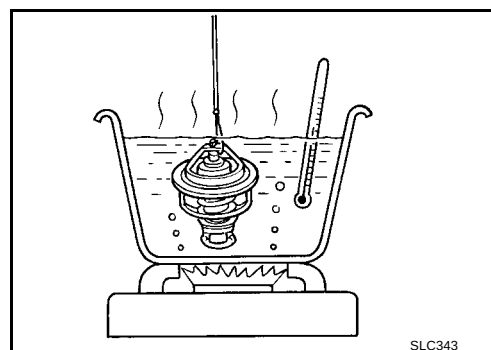
More than 8 mm/95 °C (0.31 in/203 °F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to [CO-22, "THERMOSTAT"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace thermostat.



8. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-150, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 9.
NG >> Replace engine coolant temperature sensor.

9. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-340, "Main 12 Causes of Overheating"](#) .

>> **INSPECTION END**

PROCEDURE A

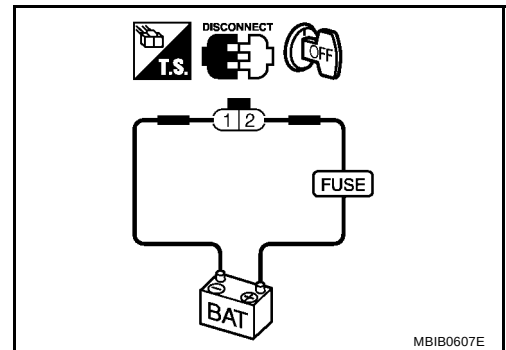
1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E12.
3. Check voltage between IPDM E/R terminal 14 and ground with CONSULT-II 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 links
- Harness for open or short between IPDM E/R and battery

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

3. CHECK COOLING FAN MOTORS CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between cooling fan motor terminal 1 and IPDM E/R terminal 12, cooling fan motor terminal 2 and ground.
Refer to wiring diagram.

Continuity should exist.

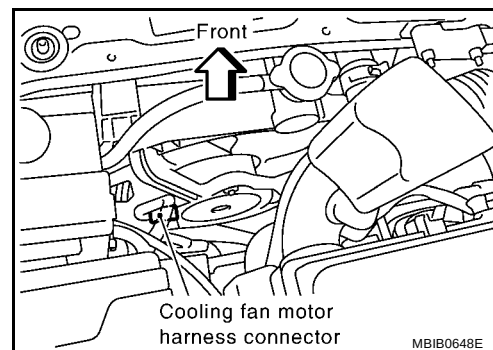
3. Also check harness for short to ground and short to power.
4. For models with air conditioner, check harness continuity between IPDM E/R terminal 10, and cooling fan motor terminal 1.
Refer to wiring diagram.

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 for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between resistor and IPDM E/R (models with A/T)
- Harness for open or short between resistor and cooling fan motor (models with A/T)
- Resistor E5 (models with A/C)

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

5. CHECK COOLING FAN MOTORS

Refer to [EC-340, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
NG >> Replace cooling fan motors.

6. CHECK INTERMITTENT INCIDENT

Perform [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connector.

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITH EURO-OBD)]

Main 12 Causes of Overheating

EBS000B7

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	See MA-13, "Engine Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-7, "LEVEL CHECK" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See CO-14, "Checking Radiator Cap" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-7, "LEAK CHECK" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-22, "THERMOSTAT" , and CO-10, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-333) .
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	See CO-7, "Changing Engine coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-7, "LEVEL CHECK" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-57, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-69, "CYLINDER BLOCK" .

*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-4, "OVERHEATING CAUSE ANALYSIS"](#) .

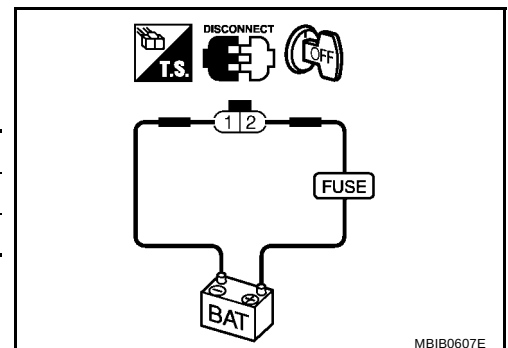
Component Inspection

COOLING FAN MOTOR

EBS000B8

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2



MBIB0607E

DTC P1223, P1224 TP SENSOR

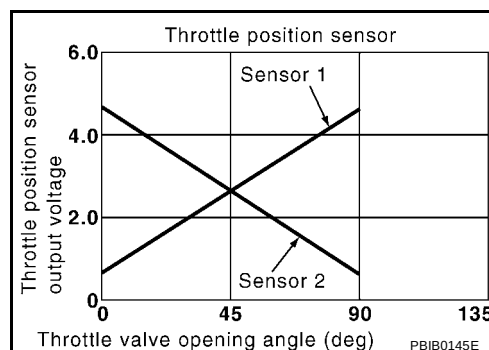
PFP:16119

Component Description

EBS000B9

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-II Reference Value in Data Monitor Mode

EBS000BA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T model) 1st (M/T model)	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

EBS000BB

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1223 1223	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.) ● Electric throttle control actuator (TP sensor 2)
P1224 1224	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, the ECM enters fail-safe mode and the MI 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

EBS000BC

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.

[CR (WITH EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-344, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Follow the procedure "WITH CONSULT-II" above.

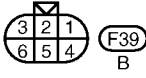
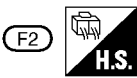
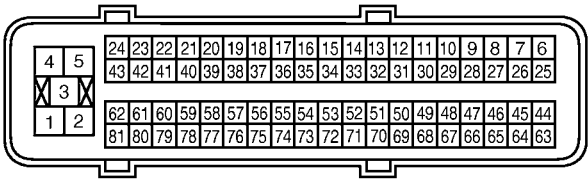
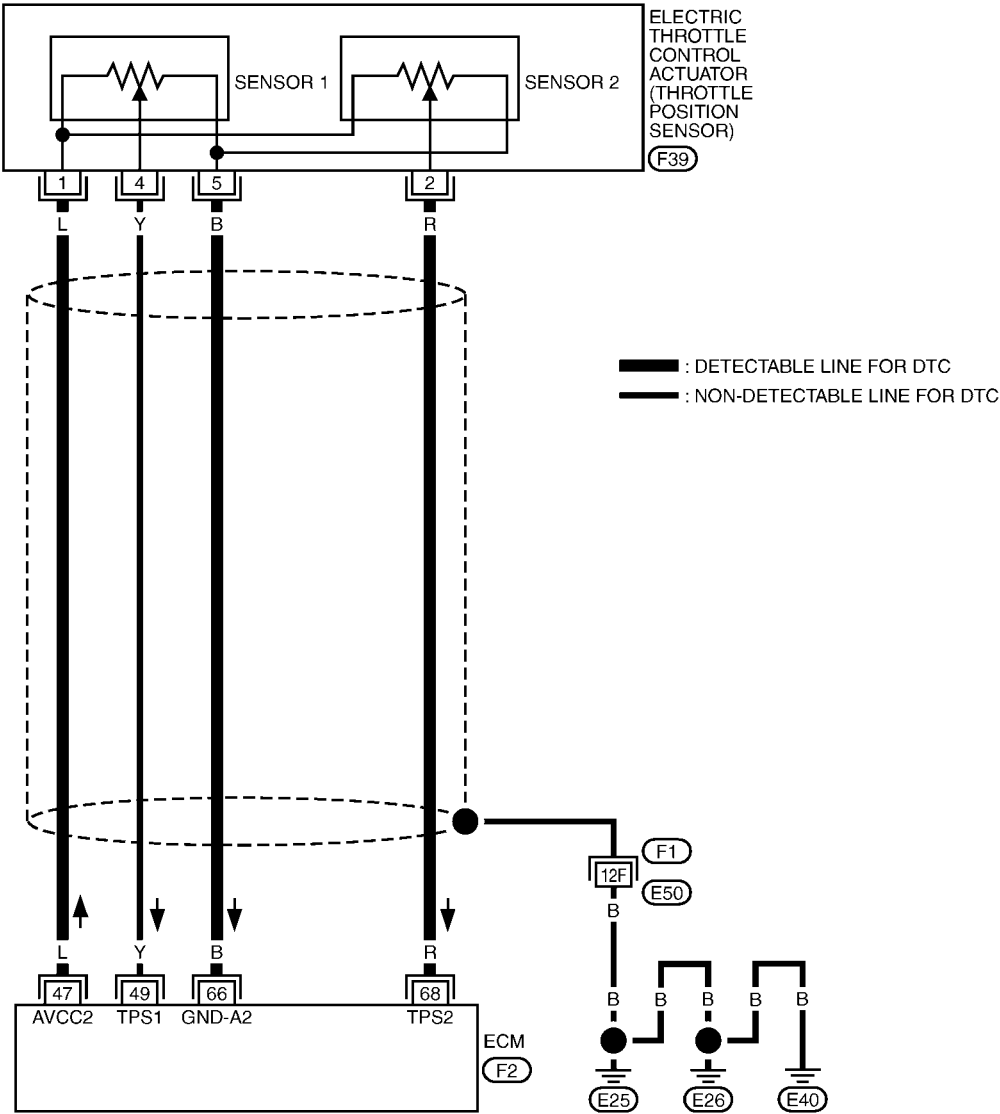
DTC P1223, P1224 TP SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000BD

EC-TPS2-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1223, P1224 TP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensors' power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

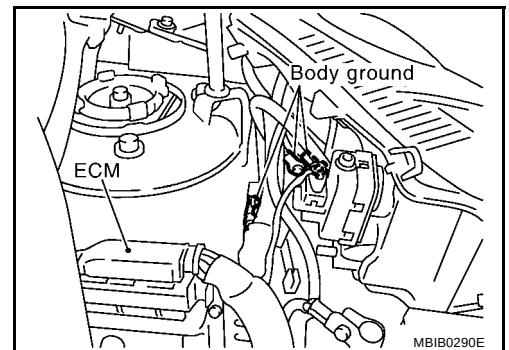
Diagnostic Procedure

EBS000BE

1. RETIGHTEN GROUND SCREWS

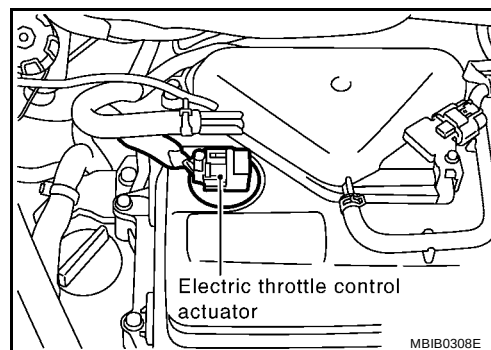
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

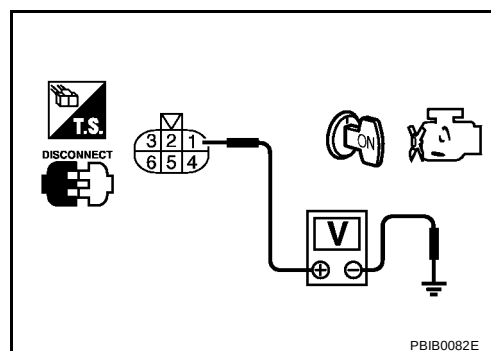


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 68 and electric throttle control actuator terminal 2. 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 THROTTLE POSITION SENSOR

Refer to [EC-346, "Component Inspection"](#).

OK or NG

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

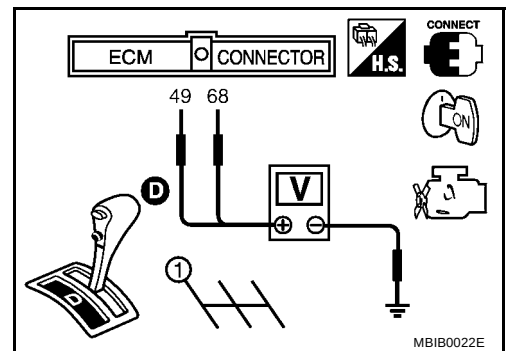
Component Inspection THROTTLE POSITION SENSOR

EBS000BF

1. Reconnect all harness connectors disconnected.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (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-34, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-34, "Idle Air Volume Learning"](#) .



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS000BG

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1225 TP SENSOR

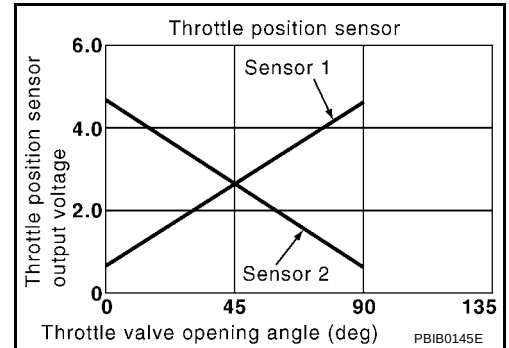
PFP:16119

Component Description

EBS000BH

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**

EBS000BI

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

EBS000BJ

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds.
4. Turn ignition switch "ON".
5. If 1st trip DTC is detected, go to [EC-348, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

EBS000BK

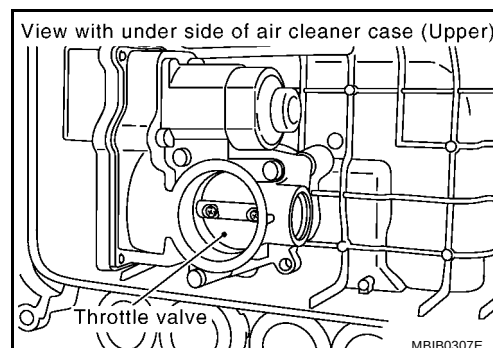
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

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-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

**Remove and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR**

EBS000BL

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1226 TP SENSOR

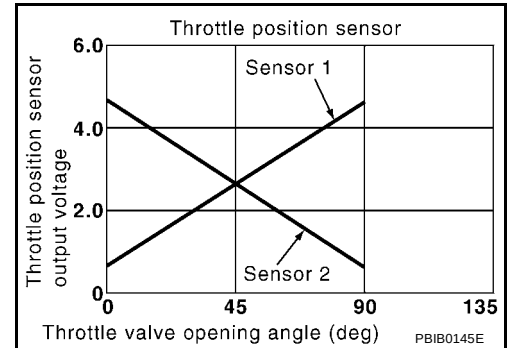
PFP:161119

Component Description

EBS000BM

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**

EBS000BN

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

EBS000BO

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds.
4. Turn ignition switch "ON".
5. Repeat steps 3 and 4, 32 times.
6. If 1st trip DTC is detected, go to [EC-350, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

EBS000BP

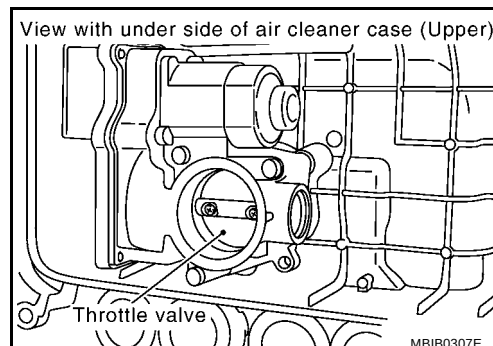
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

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-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

**Remove and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR**

EBS000BQ

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1227, P1228 APP SENSOR

PFP:18002

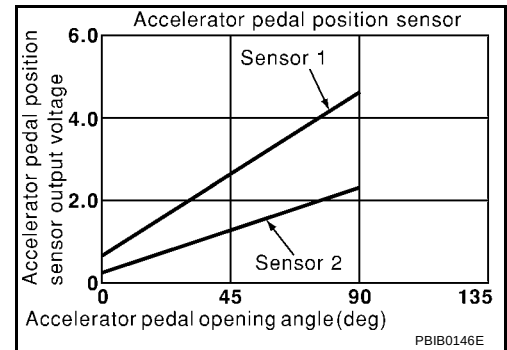
Component Description

EBS000BR

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-II Reference Value in Data Monitor Mode

EBS000BS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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 signal.

On Board Diagnosis Logic

EBS000BT

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	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)
P1228 1228	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, the ECM enters fail-safe mode and the MI 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 throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

EBS000BU

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.

[CR (WITH EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-356, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

 WITH GST

Follow the procedure "WITH CONSULT-II" above.

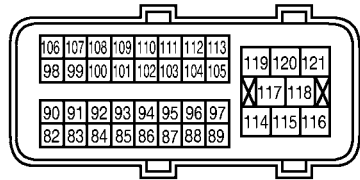
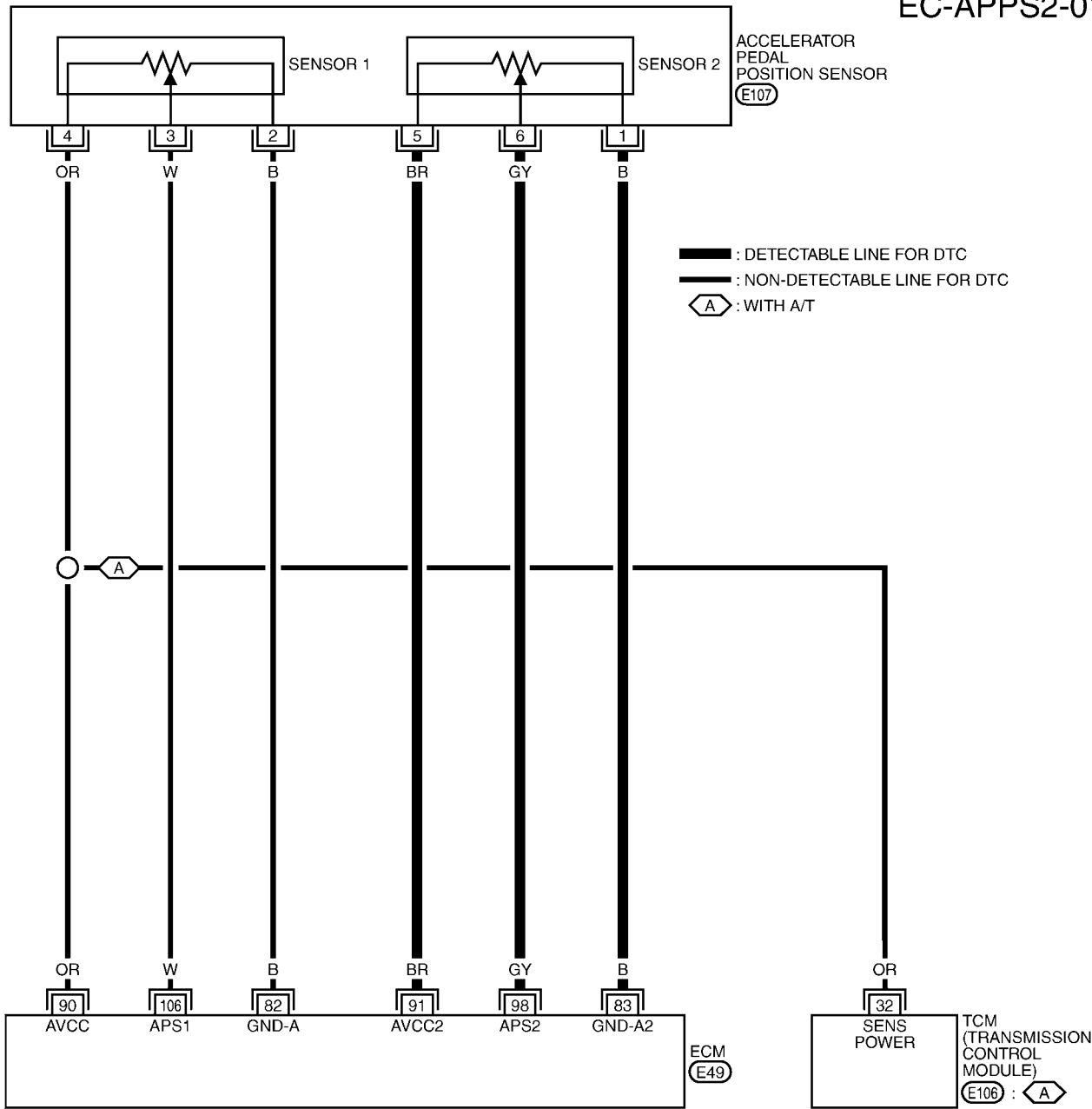
DTC P1227, P1228 APP SENSOR

[CR (WITH EURO-OBD)]

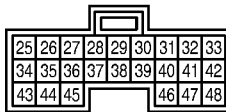
Wiring Diagram
LHD MODELS

EBS000BV

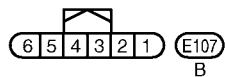
EC-APPS2-01



E49



E106



DTC P1227, P1228 APP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

DTC P1227, P1228 APP SENSOR

[CR (WITH EURO-OBD)]

RHD MODELS

EC-APPS2-02

A

EC

C

D

E

F

G

H

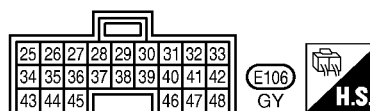
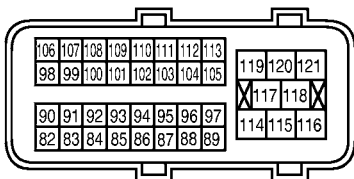
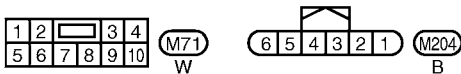
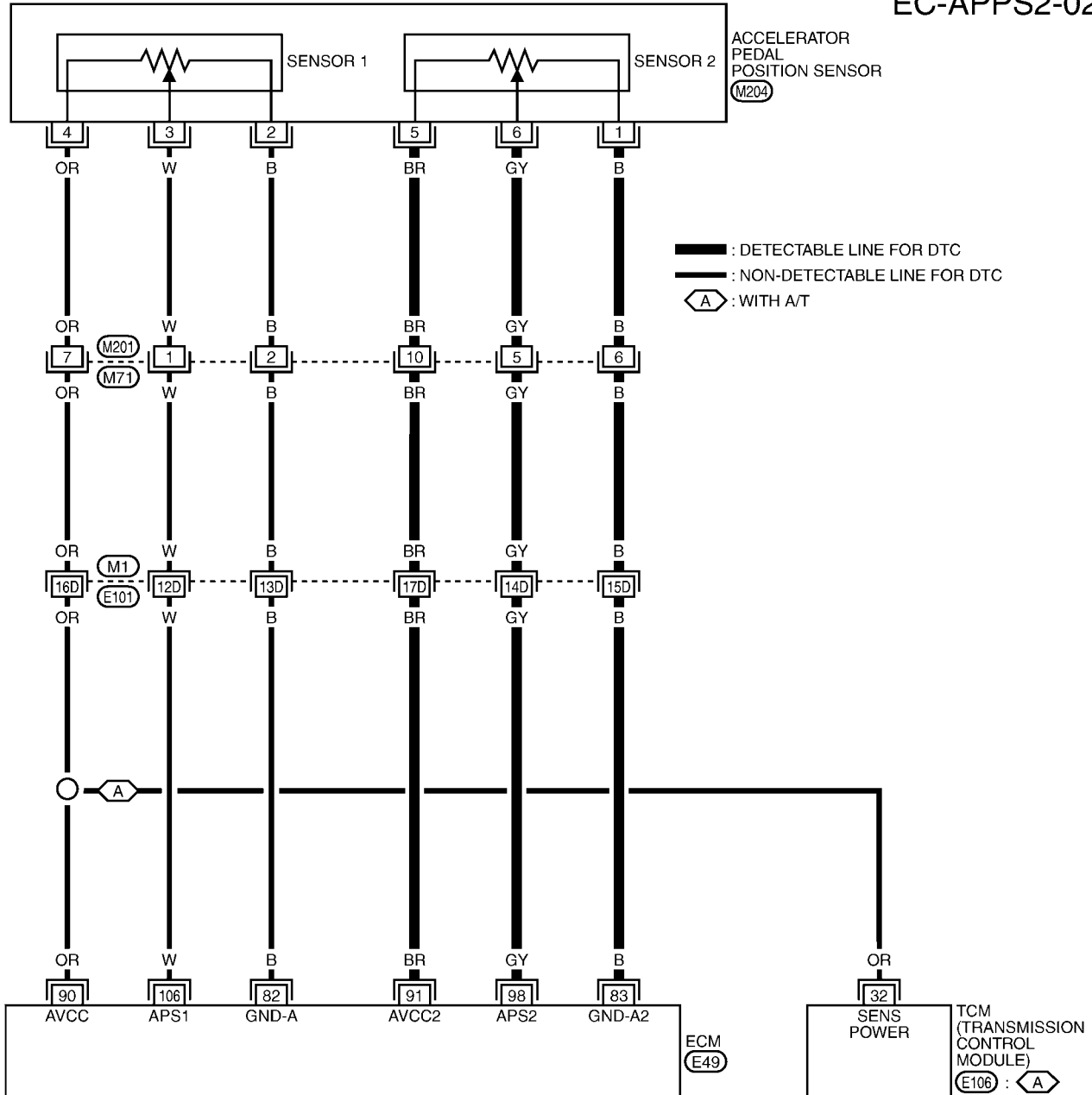
I

J

K

L

M



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0293E

DTC P1227, P1228 APP SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

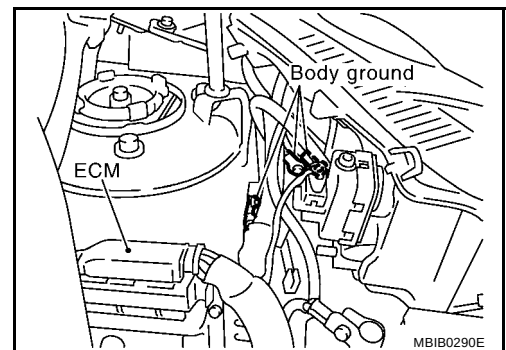
Diagnostic Procedure

EBS00OBW

1. RETIGHTEN GROUND SCREWS

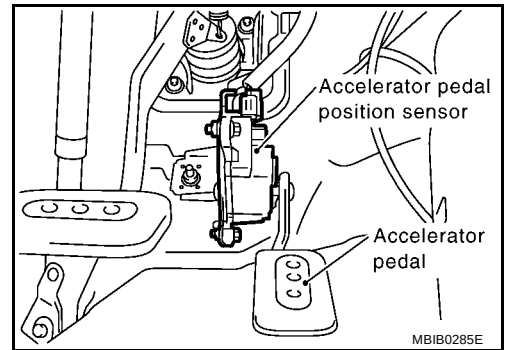
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

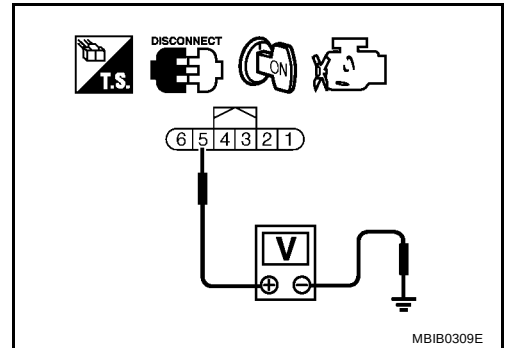


3. Check voltage between APP sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. 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 ECM terminal 83 and APP sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

6. 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 8.

NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-358, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END**

Component Inspection
ACCELERATOR PEDAL POSITION SENSOR

EBS000BX

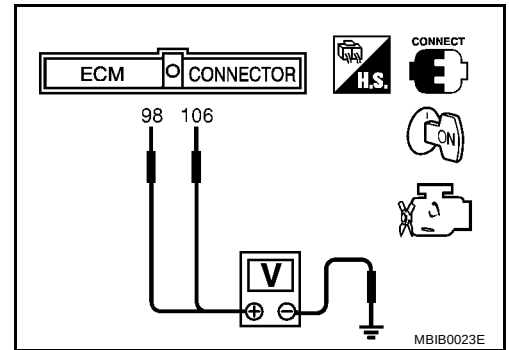
1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".

DTC P1227, P1228 APP SENSOR

[CR (WITH EURO-OBD)]

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-34, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-34, "Idle Air Volume Learning"](#) .

Remove and Installation

ACCELERATOR PEDAL

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

DTC P1229 SENSOR POWER SUPPLY

[CR (WITH EURO-OBD)]

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

EBS000BZ

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 (The TP sensor 1 and 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● ECM pin terminal

FAIL-SAFE MODE

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

EBS000C0

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-362, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

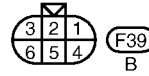
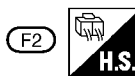
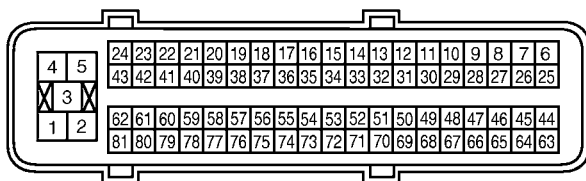
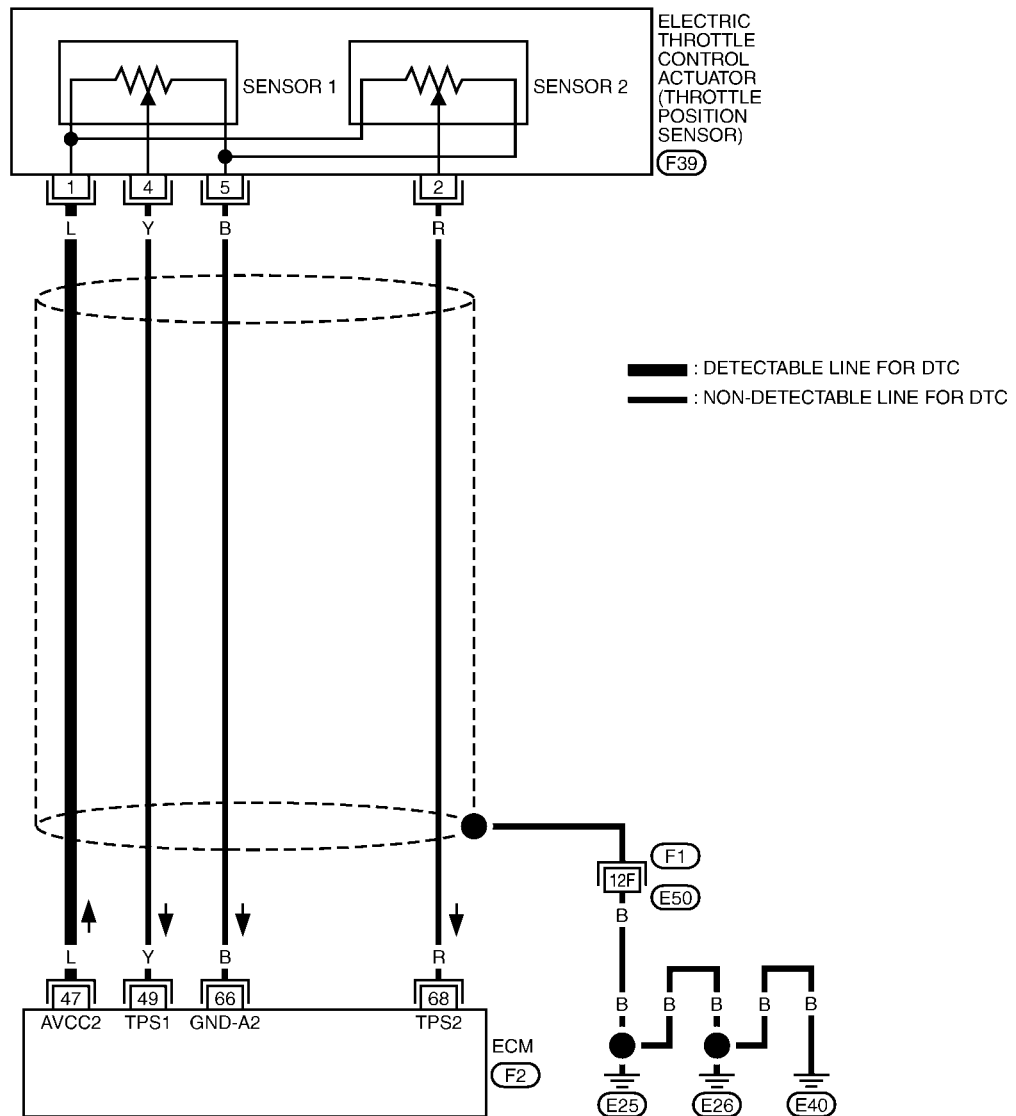
DTC P1229 SENSOR POWER SUPPLY

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000C1

EC-SEN/PW-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1229 SENSOR POWER SUPPLY

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V

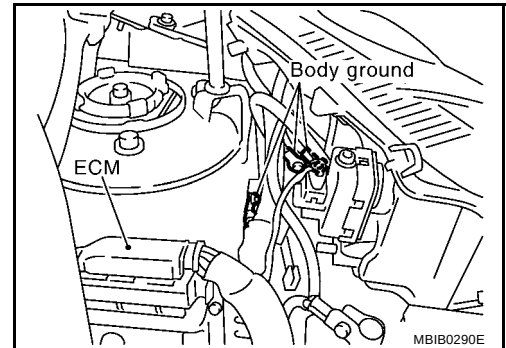
Diagnostic Procedure

EBS000C2

1. RETIGHTEN GROUND SCREWS

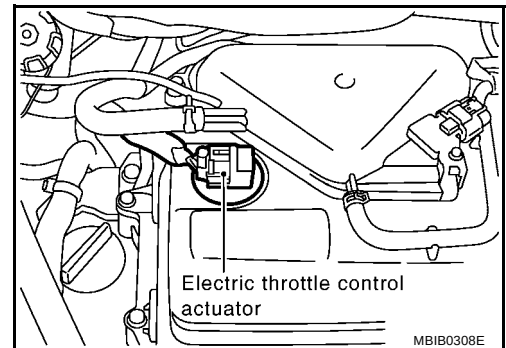
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

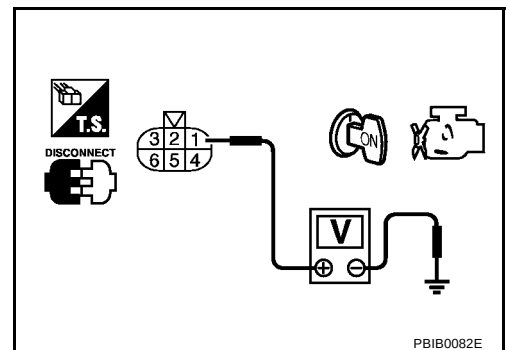


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



DTC P1229 SENSOR POWER SUPPLY

[CR (WITH EURO-OBD)]

3. CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

Check the following.

- Harness for short to power and short to ground between ECM terminal 47 and electric throttle control actuator terminal 1.
- ECM pin terminal.

OK or NG

OK >> GO TO 4.

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

4. CHECK THROTTLE POSITION SENSOR

Refer to [EC-206, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-34, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-34, "Idle Air Volume Learning"](#) .

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P1706 PNP SWITCH

PFP:32006

Component Description

EBS000C3

When the shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models), park/neutral position (PNP) switch is "ON".

ECM detects the position because the continuity of the line (the "ON" signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

EBS000C4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T model), Neutral (M/T model)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

EBS000C5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

EBS000C6

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.

④ WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
"N" and "P" position (A/T) "Neutral" position (M/T)	ON
Except the above position	OFF

If NG, go to [EC-367, "Diagnostic Procedure"](#).

If OK, go to following step.

3. Select "DATA MONITOR" mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,500 - 4,200 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.625 - 6.25 msec
VHCL SPEED SE	More than 46 km/h (29 MPH)
Selector lever	Suitable position

6. If 1st trip DTC is detected, go to [EC-367, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

Overall Function Check

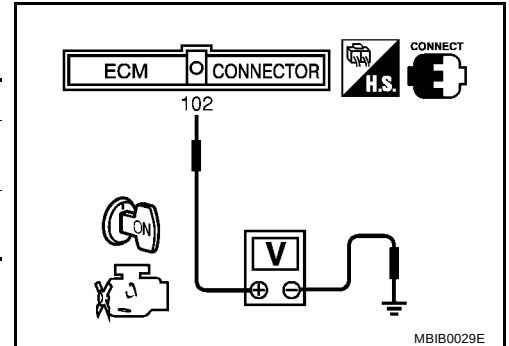
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 102 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
"N" and "P" position (A/T) "Neutral" position (M/T)	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to [EC-367, "Diagnostic Procedure"](#).



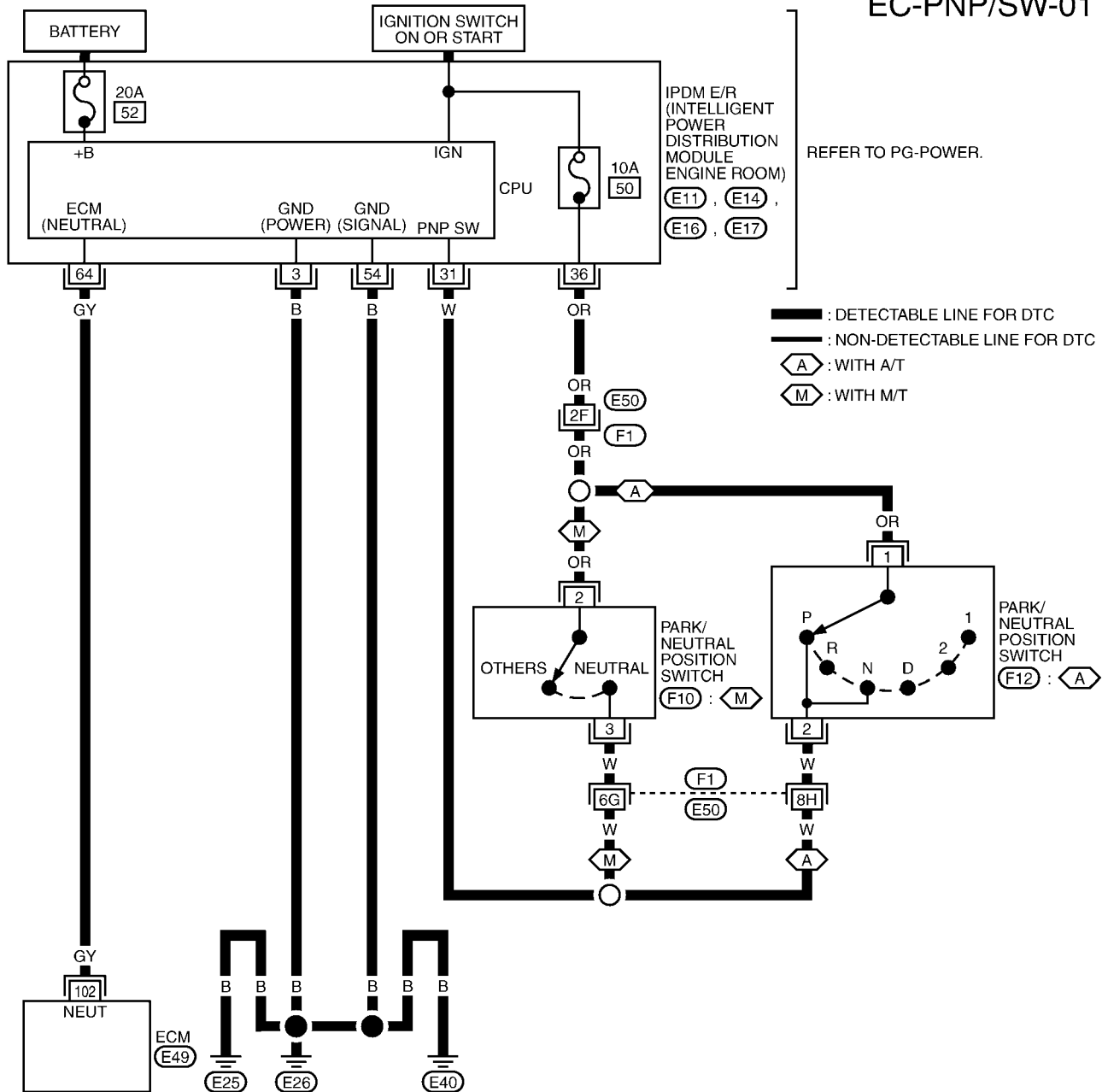
DTC P1706 PNP SWITCH

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000C8

EC-PNP/SW-01



DTC P1706 PNP SWITCH

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	GY	PNP switch	[Ignition switch "ON"] ● Shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000C9

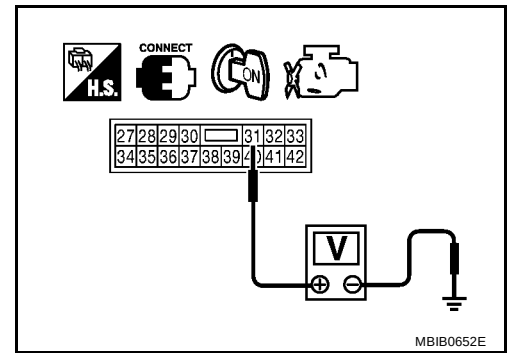
1. CHECK PNP SWITCH CIRCUIT

- Turn ignition switch "ON".
- Check voltage between IPDM E/R terminal 31 and ground under following condition.

Shift lever position	Voltage
"P" or "N" (A/T models) Neutral (M/T models)	Battery voltage (11- 14V)
Except above position	Approximately 0V

OK or NG

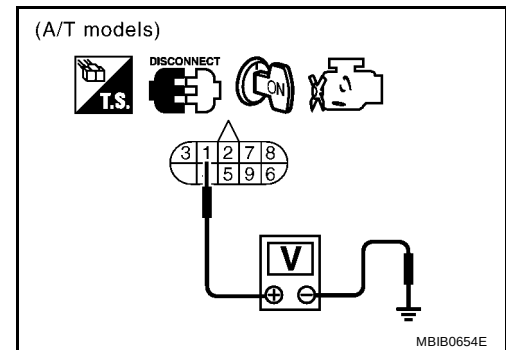
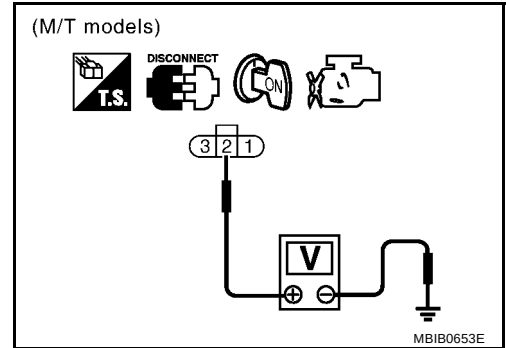
- OK >> GO TO 7.
NG >> GO TO 2.



MBIB0652E

2. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Connect IPDM E/R harness connector.
3. Disconnect PNP switch harness connector.
4. Turn ignition switch "ON".
5. Check voltage between PNP switch terminal 1(A/T models), 2(M/T models) and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

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

3. DETECT MALFUNCTIONING PARTS

Check the following.

- 10A fuse
- Harness connectors E50, F1
- IPDM E/R connector E14
- Harness for short or open between PNP switch and fuse

>> Repair or replace harness or connectors.

4. CHECK HARNESS CONTINUITY BETWEEN PNP SWITCH AND IPDM E/R

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E14.
3. Check harness continuity between IPDM E/R terminal 31 and PNP switch terminal 2(A/T models), 3(M/T models).

Continuity should exist.

OK or NG

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

5. DETECT MALFUNCTIONING PARTS

Check the following.

- Harness connectors E50,F1
- Harness for short or open between PNP switch and IPDM E/R

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

6. CHECK PNP SWITCH

Refer to [AT-116, "Component Inspection"](#) (A/T models) or [MT-8, "POSITION SWITCH"](#) (M/T models).

OK or NG

- OK >> GO TO 8.
NG >> Replace PNP switch.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E17
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 102 and IPDM E/R terminal 64.

Continuity should exist.

5. 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-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P1805 BRAKE SWITCH

[CR (WITH EURO-OBD)]

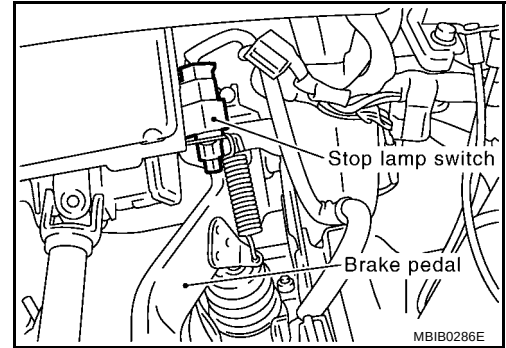
DTC P1805 BRAKE SWITCH

PFP:25320

Description

EBS00OCA

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-II Reference Value in Data Monitor Mode

EBS00OCB

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

EBS00OCC

The MI will not light up for this self-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 an 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

EBS00OCD

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

Engine operation condition in fail-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

EBS00OCE

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. If 1st trip DTC is detected, go to [EC-373, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC P1805 BRAKE SWITCH

[CR (WITH EURO-OBD)]



WITH GST

Follow the procedure “WITH CONSULT-II” above.

A

EC

C

D

E

F

G

H

I

J

K

L

M

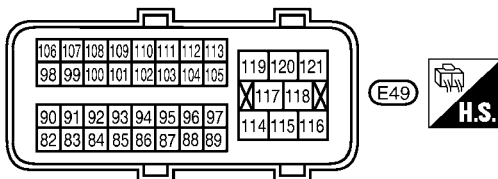
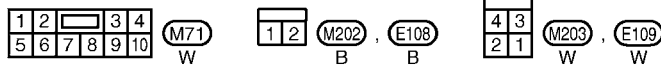
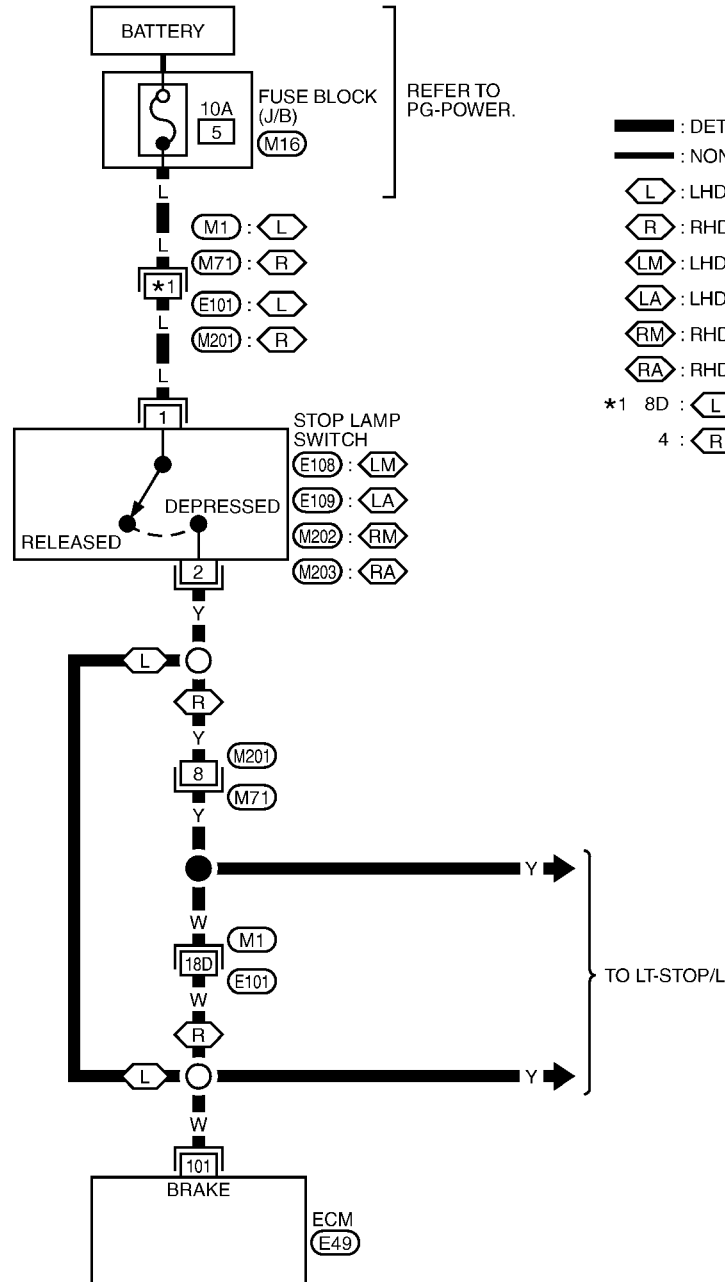
DTC P1805 BRAKE SWITCH

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000CF

EC-BRK/SW-01



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

(M16) -FUSE BLOCK-JUNCTION BOX (J/B)

MBWA0295E

DTC P1805 BRAKE SWITCH

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	W	Stop lamp switch	[Engine is running] ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000CG

1. CHECK STOP LAMP SWITCH CIRCUIT

- Turn ignition switch "OFF".
- Check the stop lamp when depressing and releasing the brake pedal.

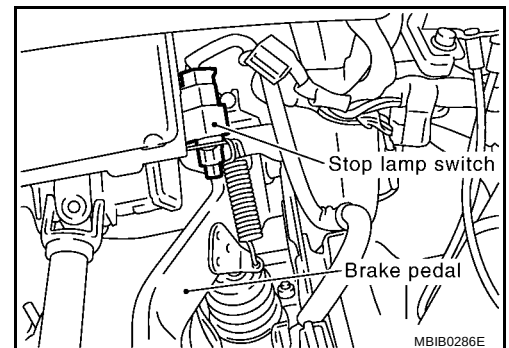
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Disconnect stop lamp switch harness connector.

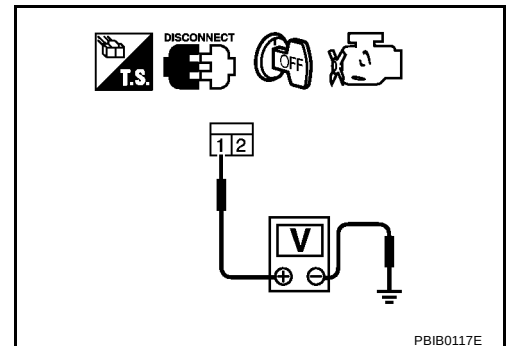


- Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M16
- Harness connectors M1, E101 (LHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open and short between stop lamp switch and fuse

>> 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. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp 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	>> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and stop lamp switch

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

6. CHECK STOP LAMP SWITCH

Refer to [EC-375, "Component Inspection"](#) .

OK or NG

OK	>> GO TO 7.
NG	>> Replace stop lamp switch.

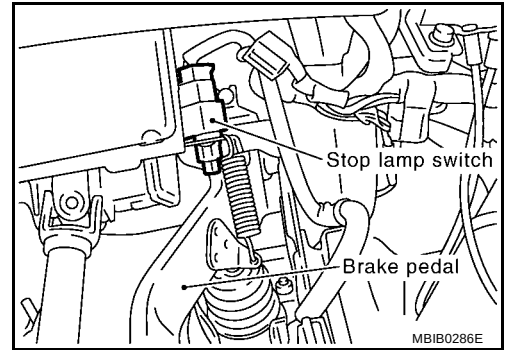
7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

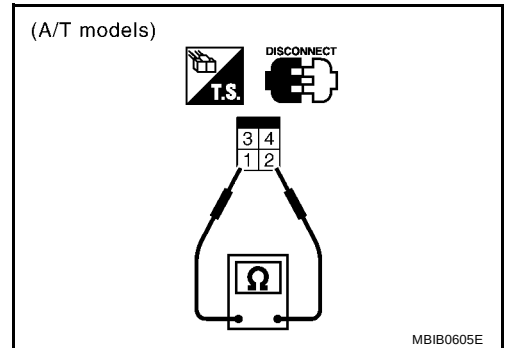
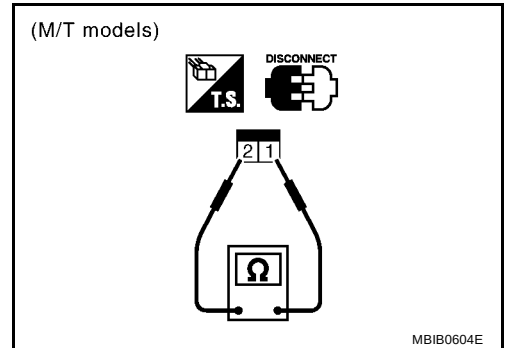
>> **INSPECTION END**

Component Inspection STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.



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 depressed	Should exist.

If NG, adjust brake pedal installation, refer to [BR-6, "BRAKE PEDAL"](#) , and perform step 2 again.

IGNITION SIGNAL

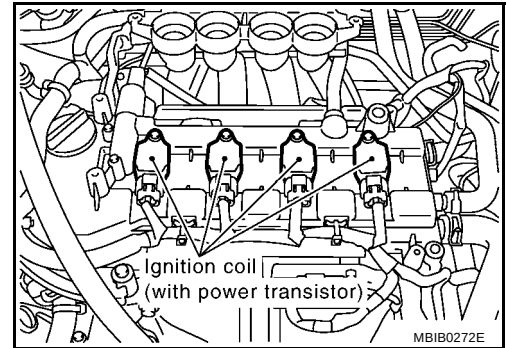
PFP:22448

Component Description

EBS000Ci

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.

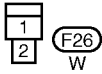
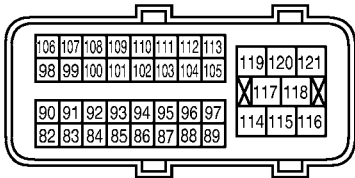
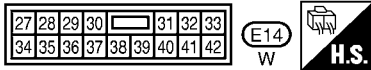
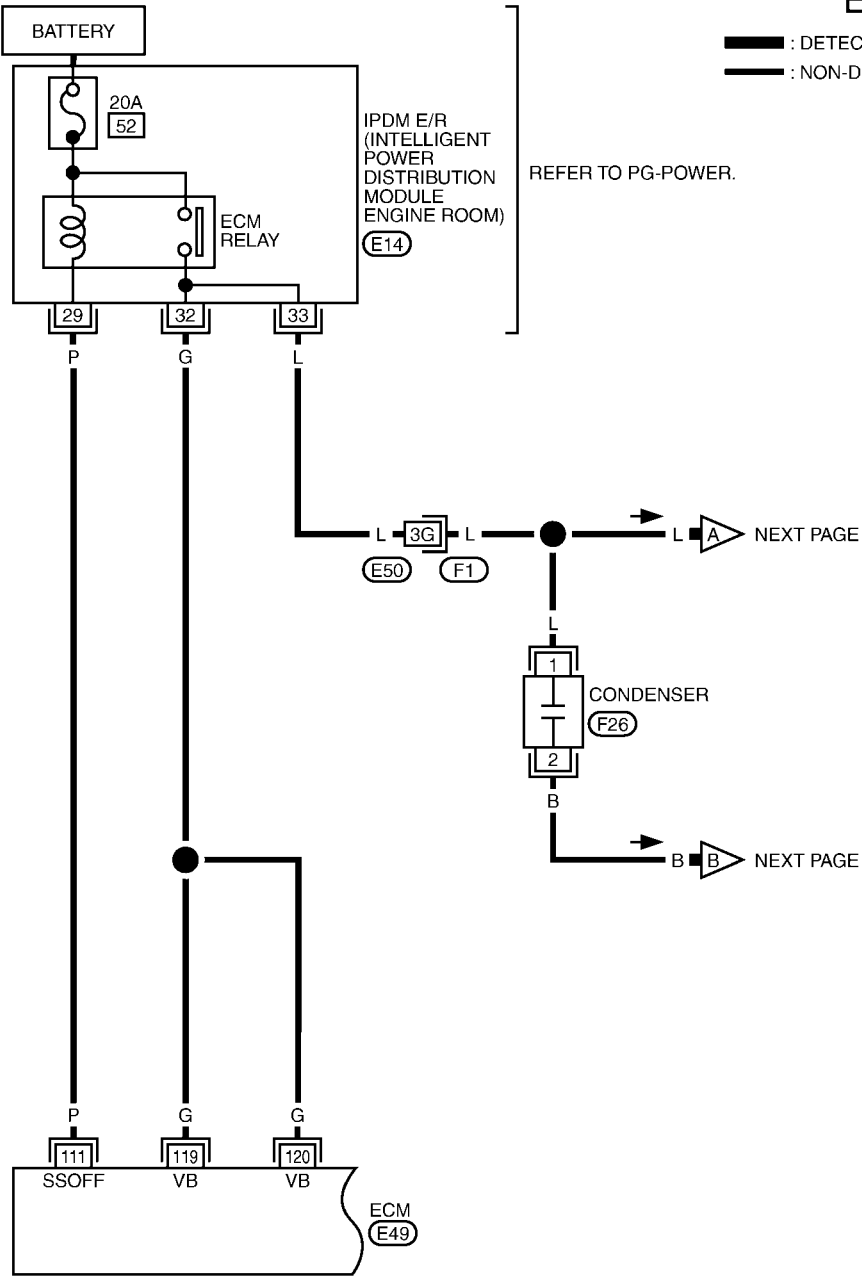


Wiring Diagram

EBS000CJ

EC-IGNSYS-01

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



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

IGNITION SIGNAL

[CR (WITH EURO-OBD)]

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

CAUTION:

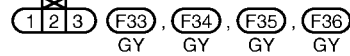
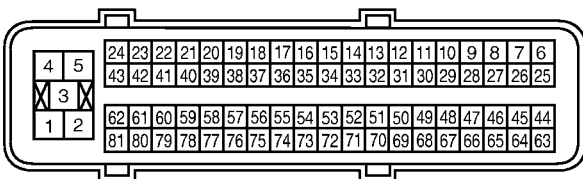
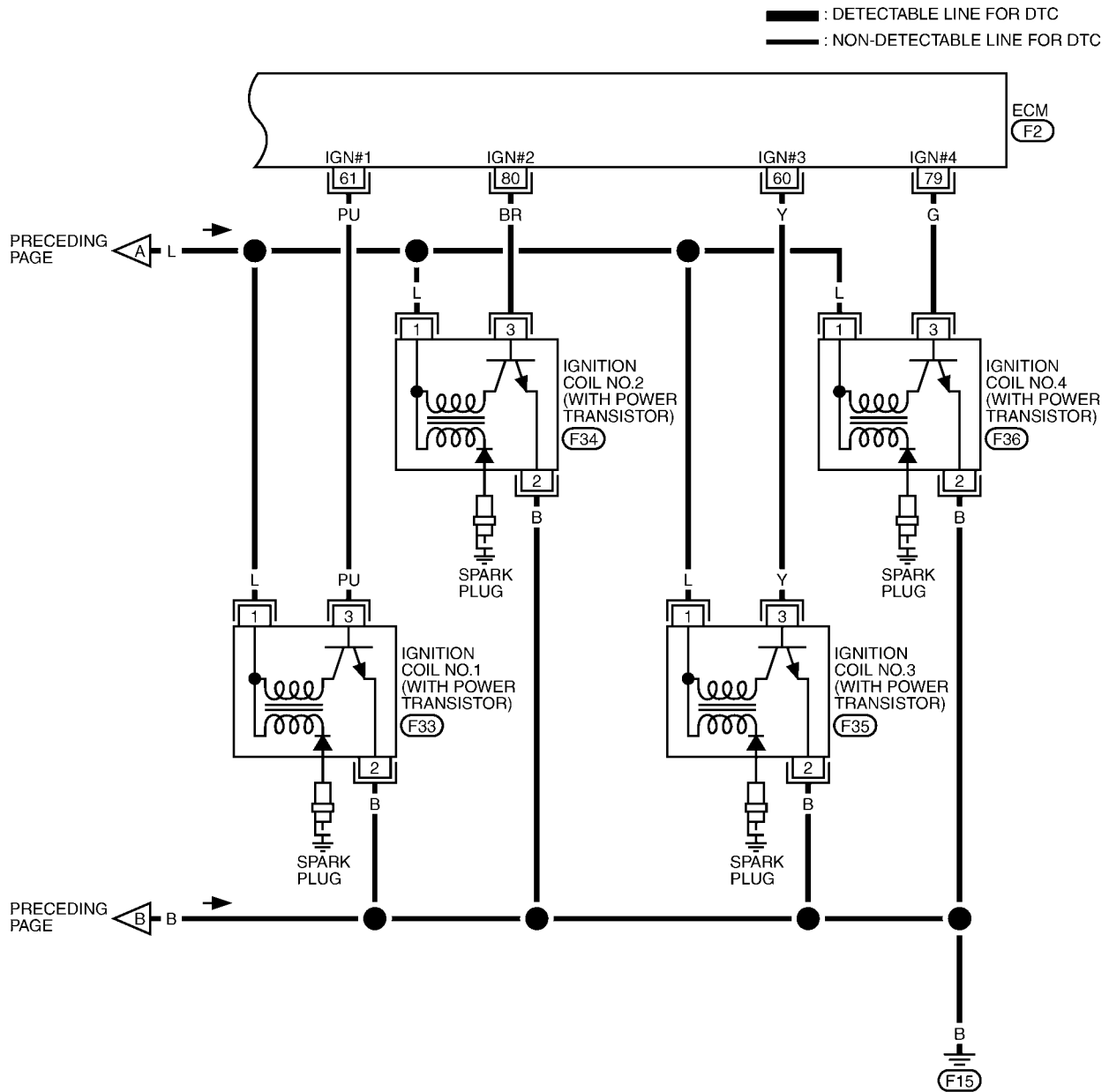
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

IGNITION SIGNAL

[CR (WITH EURO-OBD)]

EC-IGNSYS-02



MBWA0297E

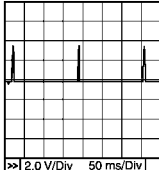
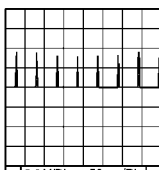
IGNITION SIGNAL

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	Y PU G BR	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] ● Warm-up condition ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

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

Diagnostic Procedure

EBS000CK

1. CHECK ENGINE START

Turn ignition switch "OFF", and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.

Yes (Without CONSULT-II)>>GO TO 3.

No >> GO TO 4.

2. CHECK OVERALL FUNCTION

 **With CONSULT-II**

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 9.

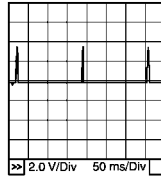
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

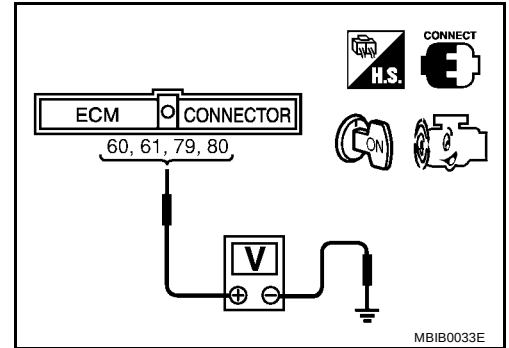
3. CHECK OVERALL FUNCTION

⊗ Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



PBIB0521E



OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 9.

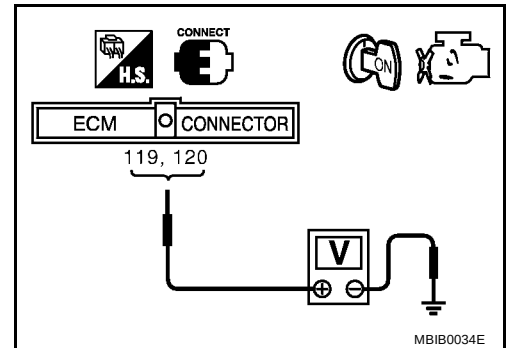
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

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-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
 NG >> Go to [EC-115, "POWER SUPPLY CIRCUIT FOR ECM"](#)



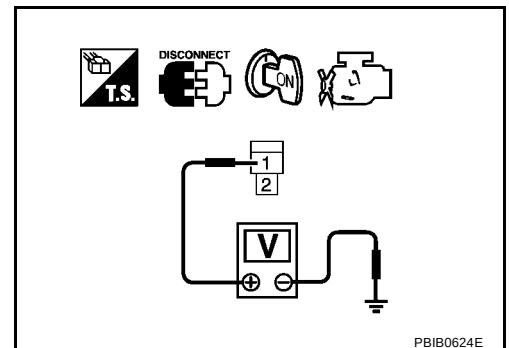
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.
3. Turn ignition switch "ON".
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



6. DETECT MALFUNCTION PART

Check the following.

- IPDM E/R harness connector E14
- Harness connectors E50, F1

>> Repair or replace

7. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser 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 8.

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

8. CHECK CONDENSER

Refer to [EC-383, "Component Inspection"](#) .

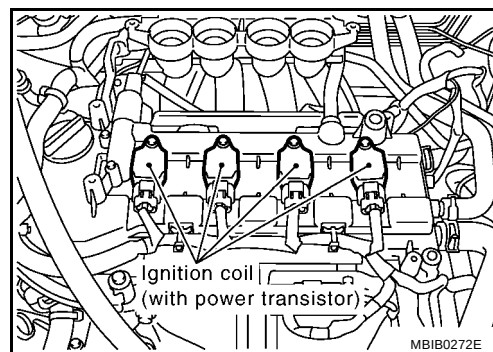
OK or NG

OK >> GO TO 9.

NG >> Replace condenser.

9. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch "OFF".
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch "ON".



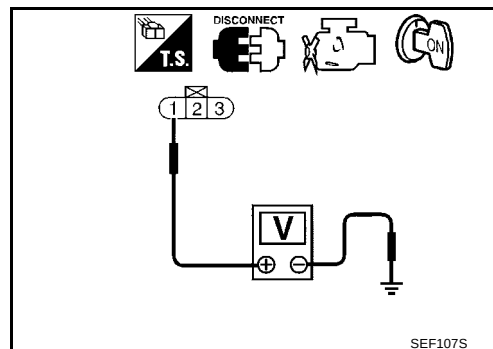
5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.



10. DETECT MALFUNCTIONING PART

Check harness for open or short between ignition coil and IPDM E/R.

>> Repair or replace harness or connectors.

11. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between ignition coil terminal 2 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 12.

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

12. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3.
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 IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-383, "Component Inspection"](#) .

OK or NG

OK >> GO TO 14.

NG >> Replace ignition coil with power transistor.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection CONDENSER

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.

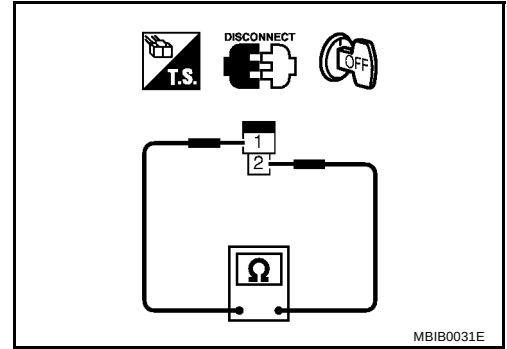
EBS000CL

IGNITION SIGNAL

[CR (WITH EURO-OBD)]

- Check resistance between condenser terminals 1 and 2.

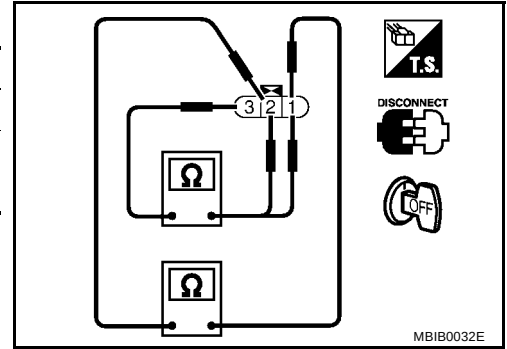
Resistance: Above 1 MΩ at 25°C (77°F)



IGNITION COIL WITH POWER TRANSISTOR

- Turn ignition switch "OFF".
- Disconnect ignition coil harness connector.
- Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
2 and 3	Except 0 or ∞
1 and 2	Except 0
1 and 3	



Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-25, "IGNITION COIL"](#) .

EBS00OCM

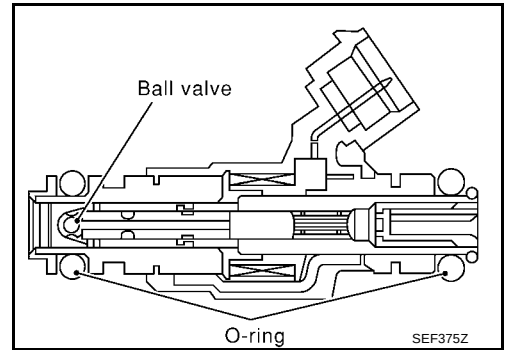
INJECTOR CIRCUIT

PPF:16600

Component Description

EBS000CN

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

EBS000CO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
INJ PULSE-B1	● Engine: After warming up ● Shift lever: 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

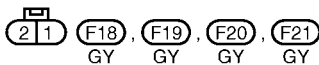
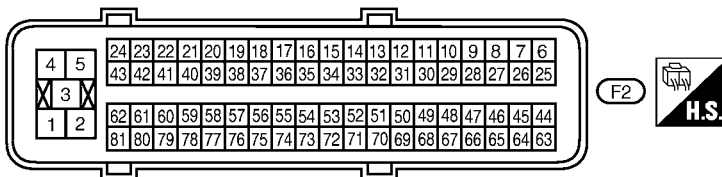
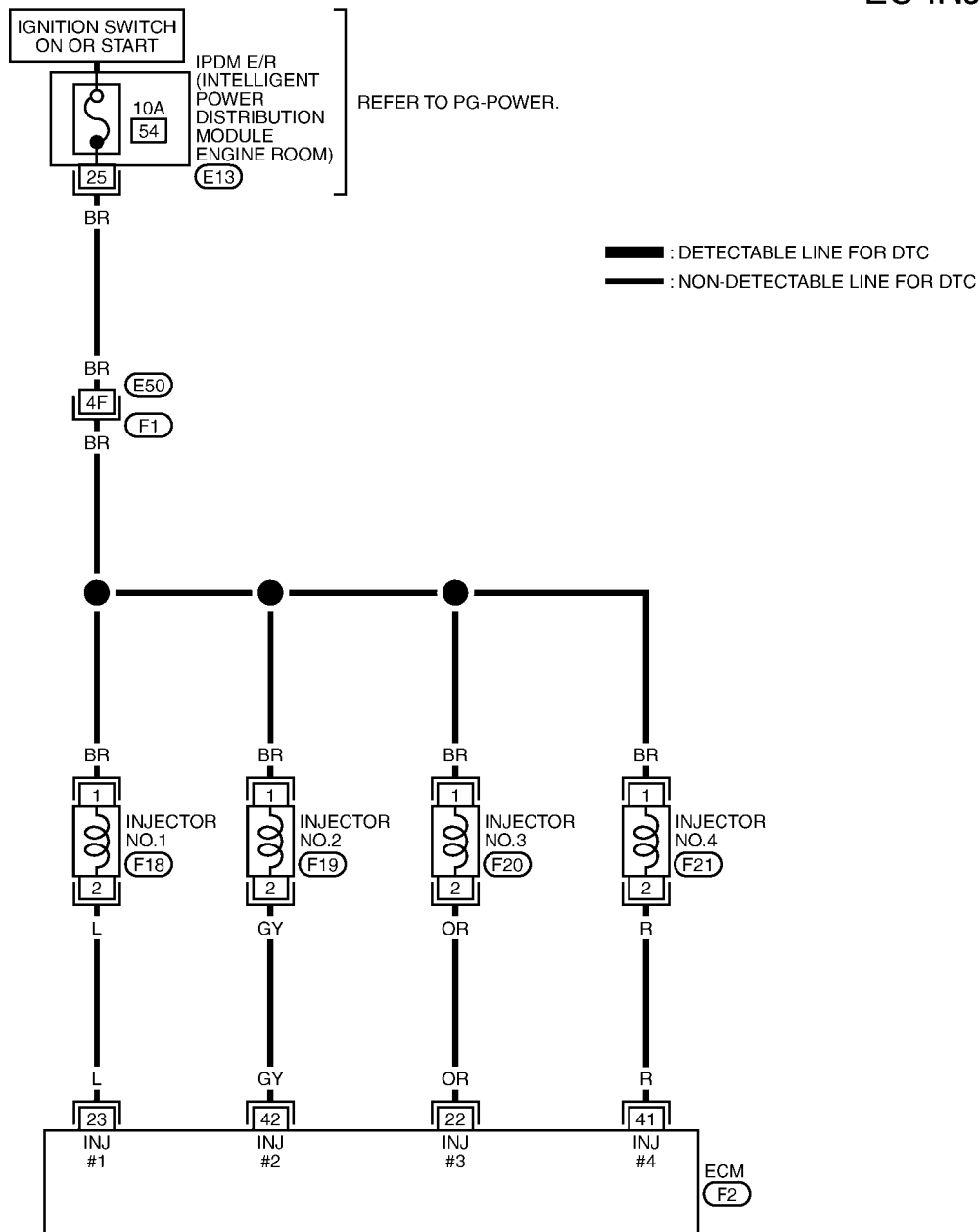
INJECTOR CIRCUIT

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000CP

EC-INJECT-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE
JUNCTION (SMJ)

MBWA0298E

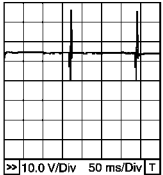
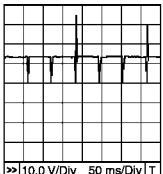
INJECTOR CIRCUIT

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	OR L R GY	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

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

Diagnostic Procedure

EBS00OCQ

1. INSPECTION START

Turn ignition switch to "START".

Is any cylinder ignited?

Yes or No

- Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

④ With CONSULT-II

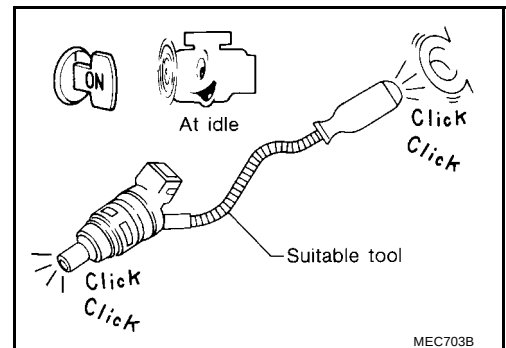
1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

⊗ Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
Clicking noise should be heard.

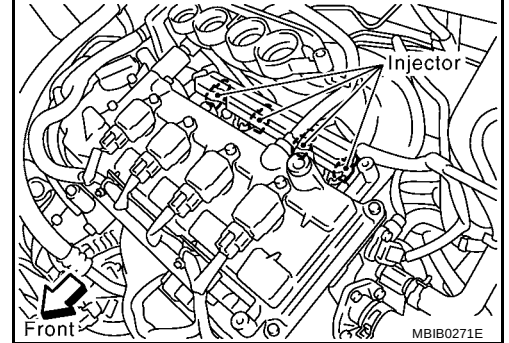


OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".

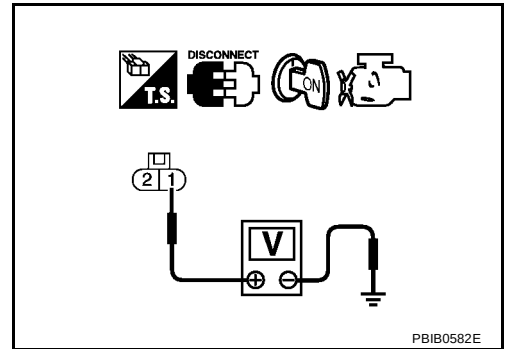


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK	>> GO TO 5.
NG	>> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E50
- IPDM E/R connector E13
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. 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.

6. CHECK INJECTOR

Refer to [EC-390, "Component Inspection"](#).

OK or NG

OK	>> GO TO 7.
NG	>> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

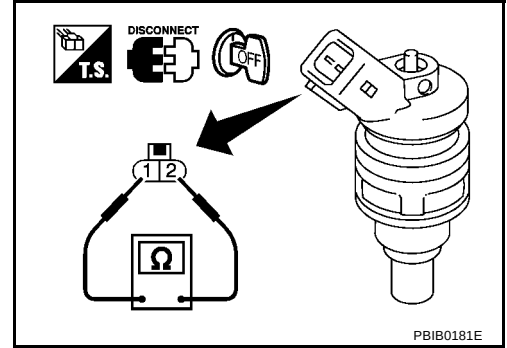
>> INSPECTION END

Component Inspection INJECTOR

EBS000CR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 12.1 - 12.9Ω [at 20°C (68°F)]



EBS000CS

Removal and Installation INJECTOR

Refer to [EM-28, "FUEL INJECTOR AND FUEL TUBE"](#) .

FUEL PUMP CIRCUIT

[CR (WITH EURO-OBD)]

FUEL PUMP CIRCUIT

PFP:17042

Description SYSTEM DESCRIPTION

EBS000CT

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*		

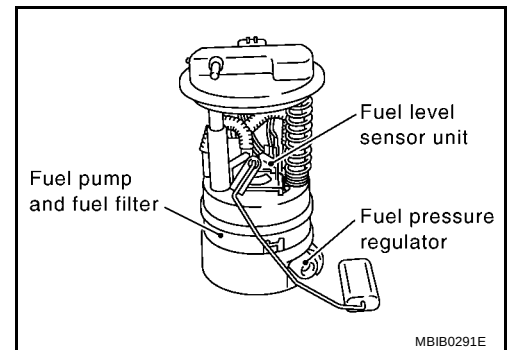
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS000CU

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON	ON
	● Engine running or cranking	
	● Except above conditions	OFF

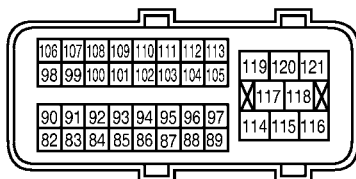
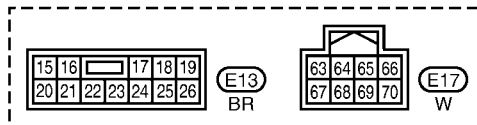
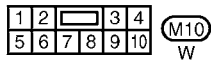
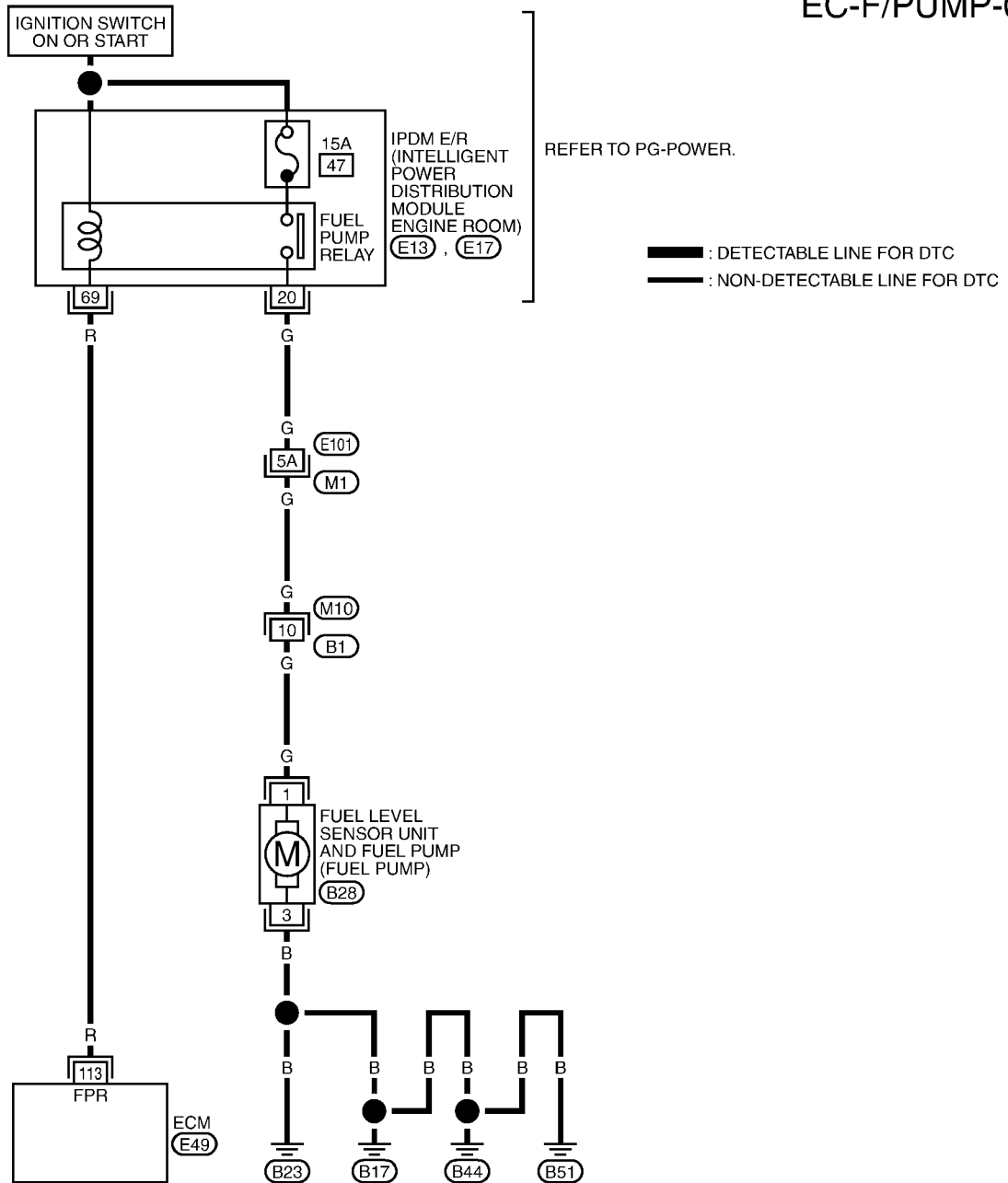
FUEL PUMP CIRCUIT

[CR (WITH EURO-OBD)]

EBS000CV

Wiring Diagram

EC-F/PUMP-01



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE
JUNCTION (SMJ)

MBWA0299E

FUEL PUMP CIRCUIT

[CR (WITH EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	R	Fuel pump relay	[Ignition switch "ON"] ● For 1 seconds after turning ignition switch "ON"	0 - 1.0V
			[Engine is running] [Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

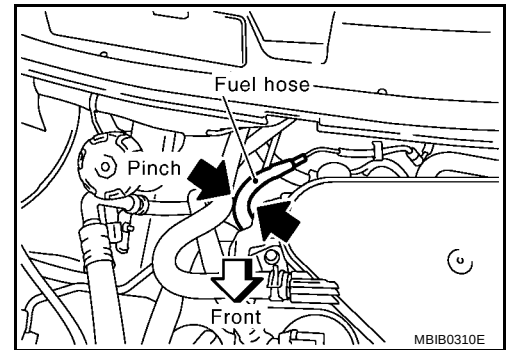
EBS000CW

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with two fingers.
Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned "ON".

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



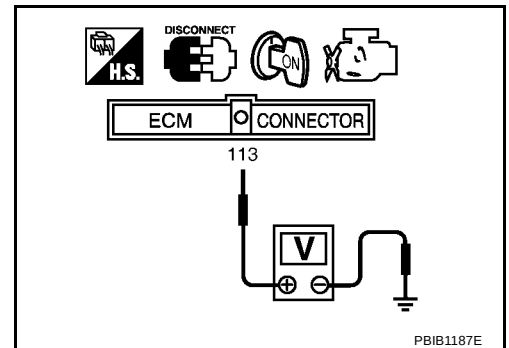
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ECM terminals 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



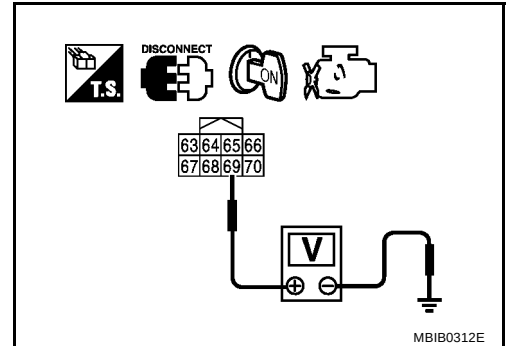
3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E17.
3. Turn ignition switch "ON".
4. Check voltage between IPDM E/R terminal 69 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 9.



4. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector E17
- Harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

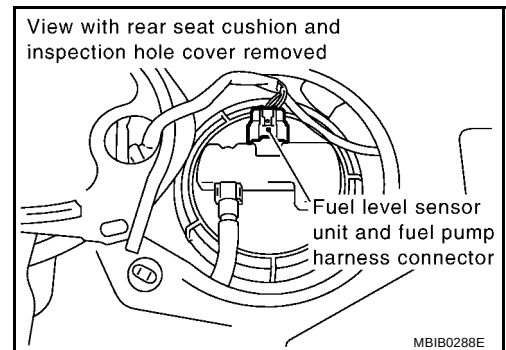
1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between terminal 20 of IPDM E/R connector E13 and fuel level sensor unit and fuel pump terminal 1, fuel level sensor unit and fuel pump terminal 3 and body ground. Refer to 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 M1, E101
- Harness connectors B1, M10
- Harness for open or short between fuel level sensor unit and fuel pump and IPDM E/R
- Harness for open or short between fuel level sensor unit and fuel pump and body ground

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

7. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and terminal 69 of IPDM E/R connector E17.
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 or short between ECM and IPDM E/R.

8. CHECK FUEL PUMP

Refer to [EC-395, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace fuel pump.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

OK or NG

OK >> Replace IPDM E/R

NG >> Repair or replace harness or connector

>> **INSPECTION END**

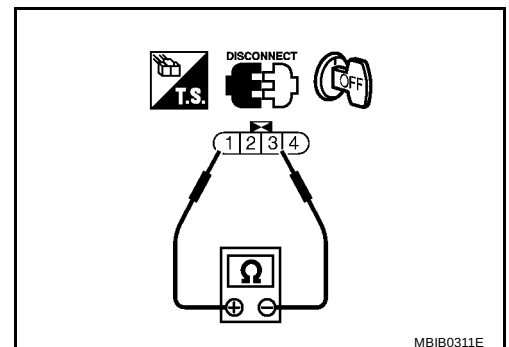
Component Inspection

FUEL PUMP

EBS00OCX

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 1.0Ω [at 25°C (77°F)]



EBS00OCY

Removal and Installation

FUEL PUMP

Refer to [FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY"](#).

REFRIGERANT PRESSURE SENSOR

[CR (WITH EURO-OBD)]

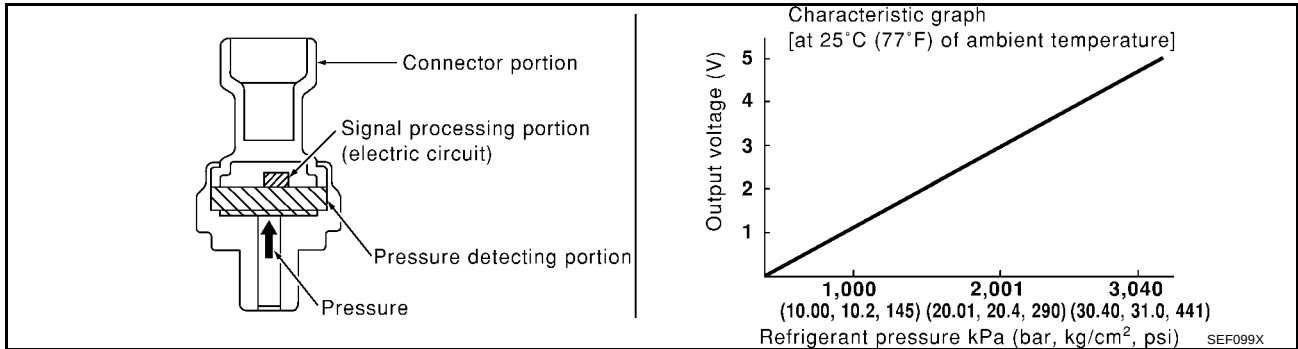
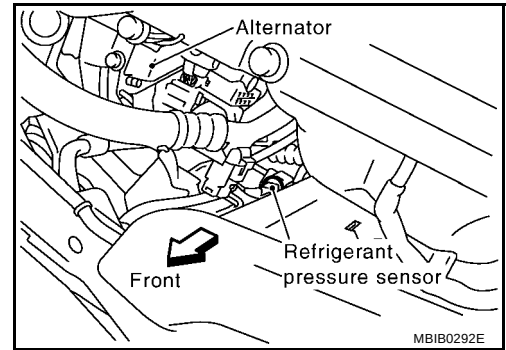
REFRIGERANT PRESSURE SENSOR

PFP:92136

Component Description

EBS000CZ

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, and ECM controls cooling fan system.



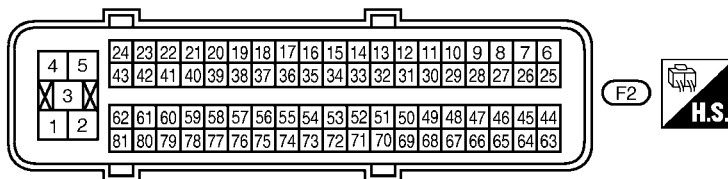
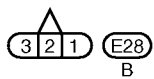
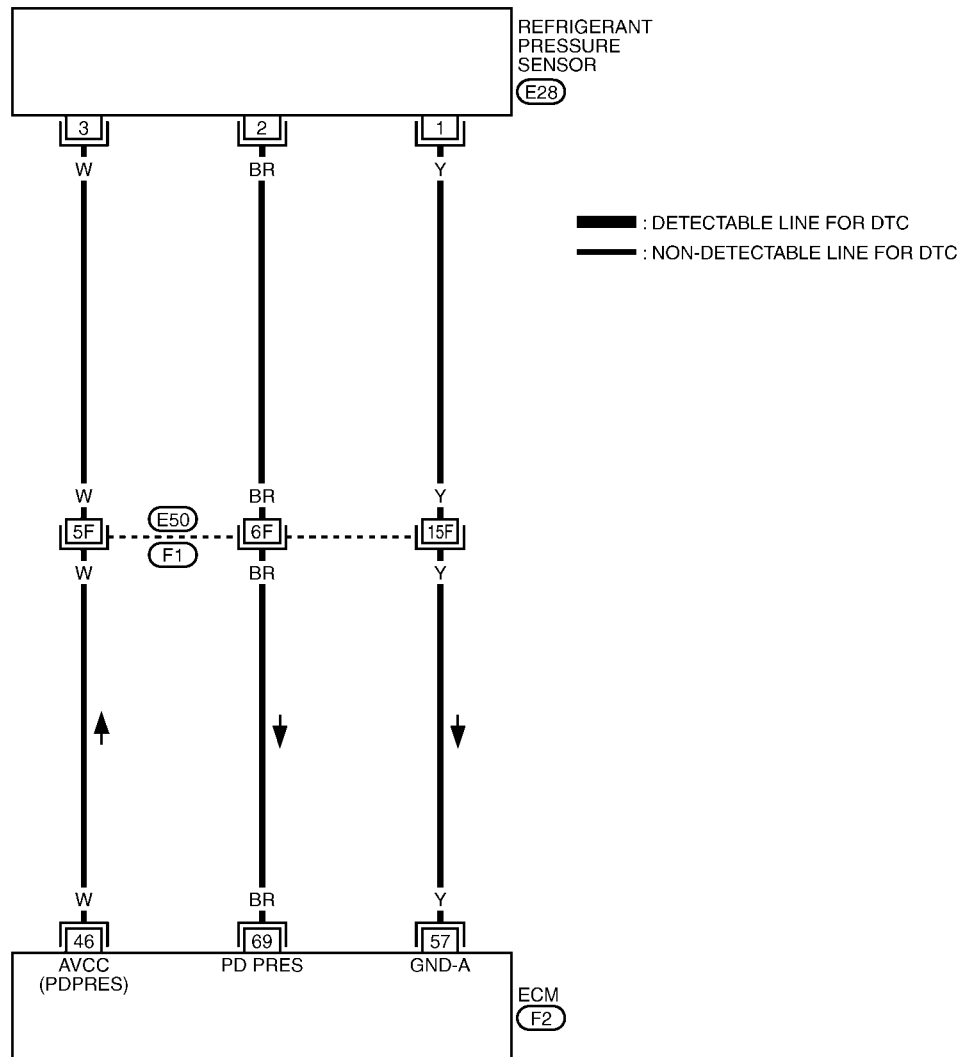
REFRIGERANT PRESSURE SENSOR

[CR (WITH EURO-OBD)]

Wiring Diagram

EBS000D0

EC-RP/SEN-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0300E

REFRIGERANT PRESSURE SENSOR

[CR (WITH EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Sensor's ground (Refrigerant pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
46	W	Sensor's power supply (Refrigerant pressure sensor)	[Ignition switch "ON"]	Approximately 5V
69	BR	Refrigerant pressure sensor	[Engine is running] ● Warm-up condition ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V

Diagnostic Procedure

EBS000D1

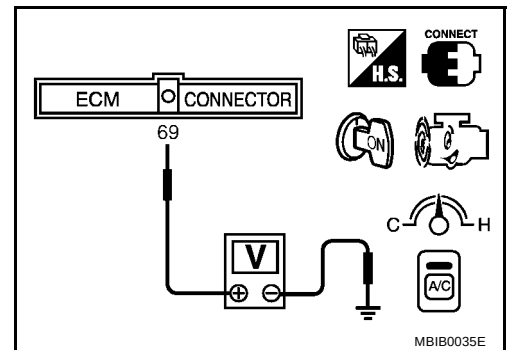
1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

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 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

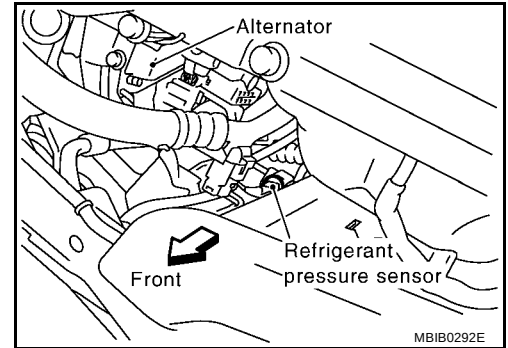


REFRIGERANT PRESSURE SENSOR

[CR (WITH EURO-OBD)]

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch "OFF".
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch "ON".

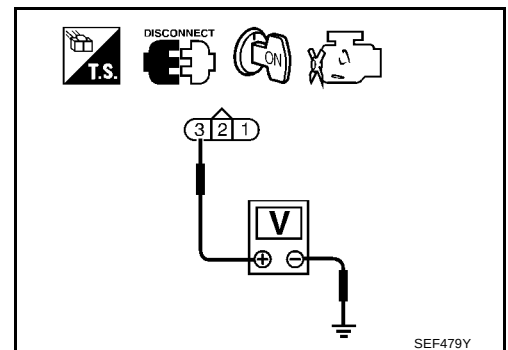


5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

4. 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 ECM terminal 57 and refrigerant pressure sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- 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.

REFRIGERANT PRESSURE SENSOR

[CR (WITH EURO-OBD)]

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 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

- OK >> GO TO 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- 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.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-114, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace refrigerant pressure sensor.
- NG >> Repair or replace.

Removal and Installation REFRIGERANT PRESSURE SENSOR

EBS000D2

Refer to [ATC-68, "REFRIGERANT LINES"](#) (Automatic air conditioner models) or [MTC-56, "REFRIGERANT LINES"](#) (Manual air conditioner models).

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

EBS000D3

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from IPDM E/R to ECM.

CONSULT-II Reference Value in Data Monitor Mode

EBS000D4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF

Diagnostic Procedure

EBS000D5

1. INSECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 6.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch "ON".
2. Connect CONSULT-II and select "DATA MONITOR" mode.
3. 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 3.

NG >> GO TO 4.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

3. 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 >> **INSPECTION END**

NG >> GO TO 5.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-14, "REAR WINDOW DEFOGGER"](#) .

>> **INSPECTION END**

5. CHECK HEADLAMP SYSTEM

Refer to [LT-5, "HEADLAMP -CONVENTIONAL TYPE-"](#) or [LT-32, "HEADLAMP - DAYTIME LIGHT SYSTEM -"](#).

>> INSPECTION END

6. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-14, "REAR WINDOW DEFOGGER"](#) .

OK or NG

OK >> GO TO 7.

NG >> Repair or replace

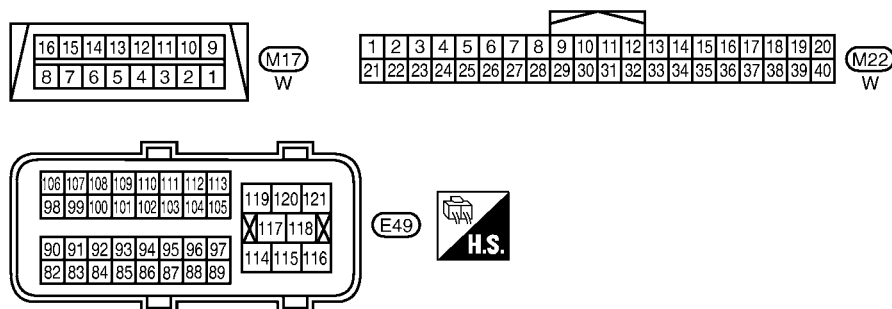
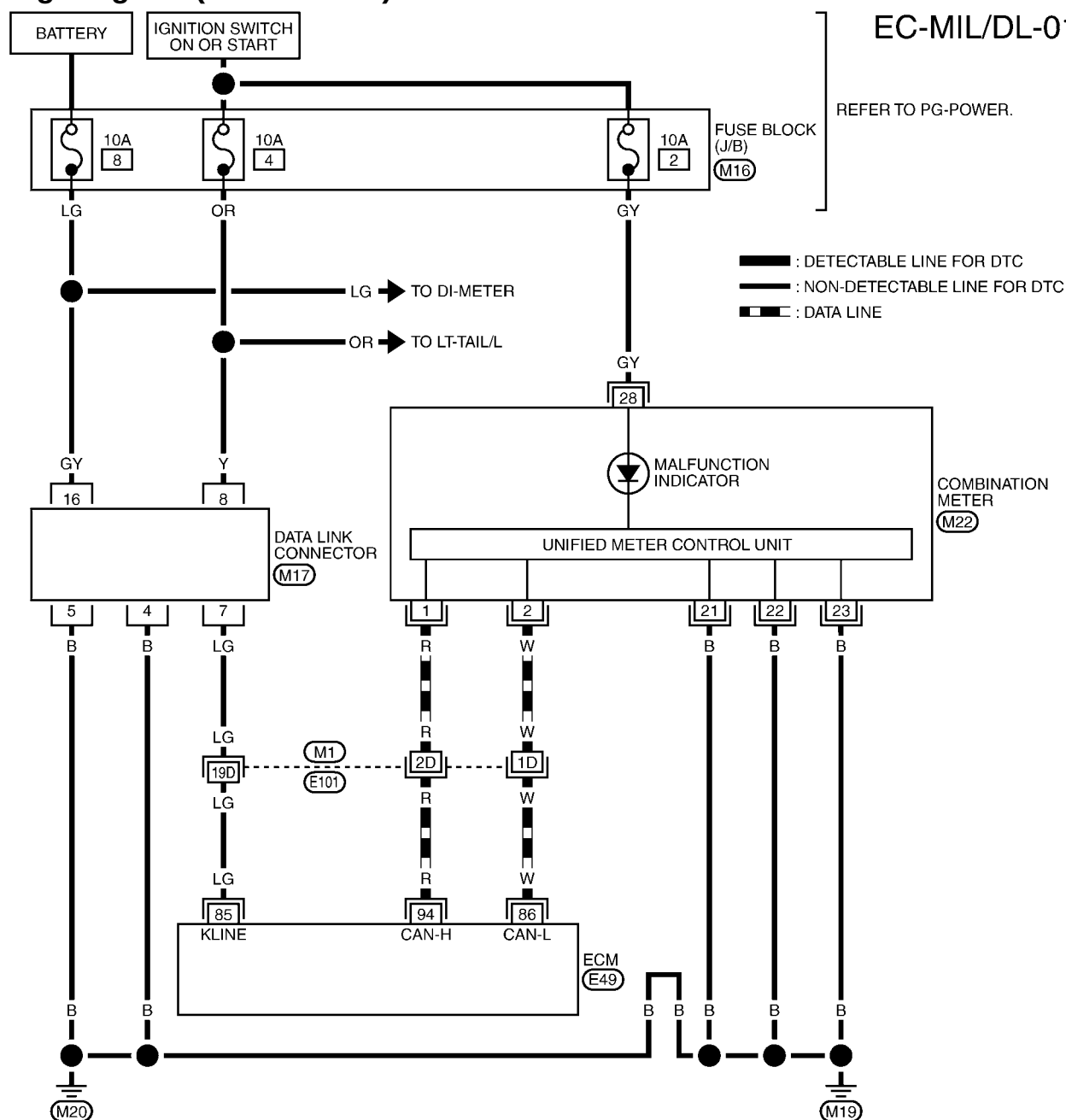
7. CHECK HEADLAMP SYSTEM

Refer to [LT-5, "HEADLAMP -CONVENTIONAL TYPE-"](#) or [LT-32, "HEADLAMP - DAYTIME LIGHT SYSTEM -"](#).

>> INSPECTION END

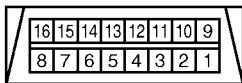
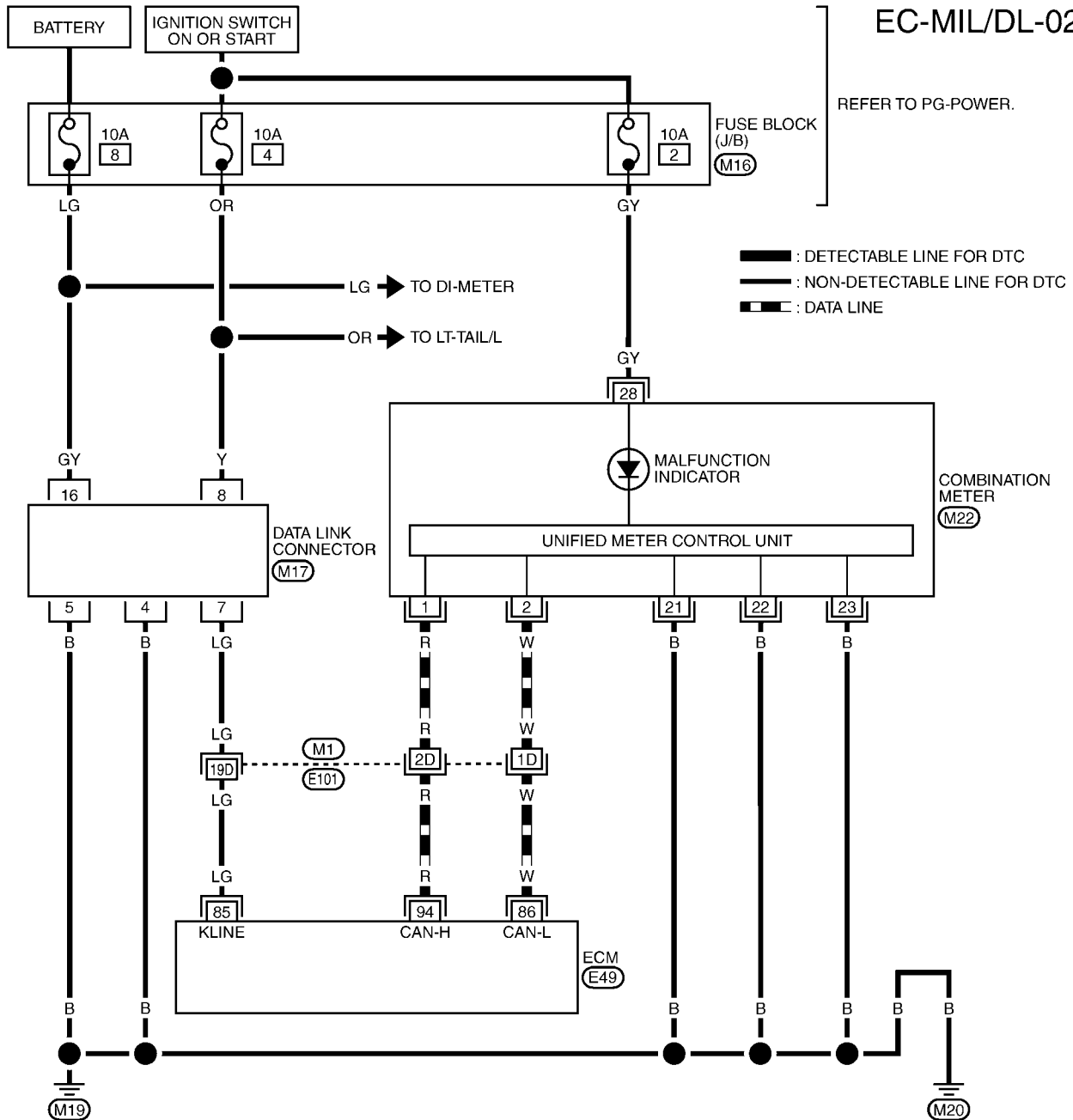
Wiring Diagram (LHD Models)

EBS00OD6

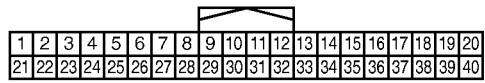


(M1) -SUPER MULTIPLE
JUNCTION (SMJ)
(M16) -FUSE BLOCK
-JUNCTION BOX (J/B)

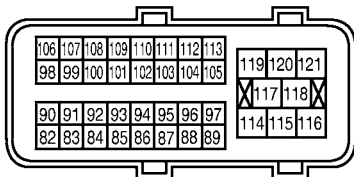
Wiring Diagram (RHD Models)



(M17)
W



(M22)
W



(E49)



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

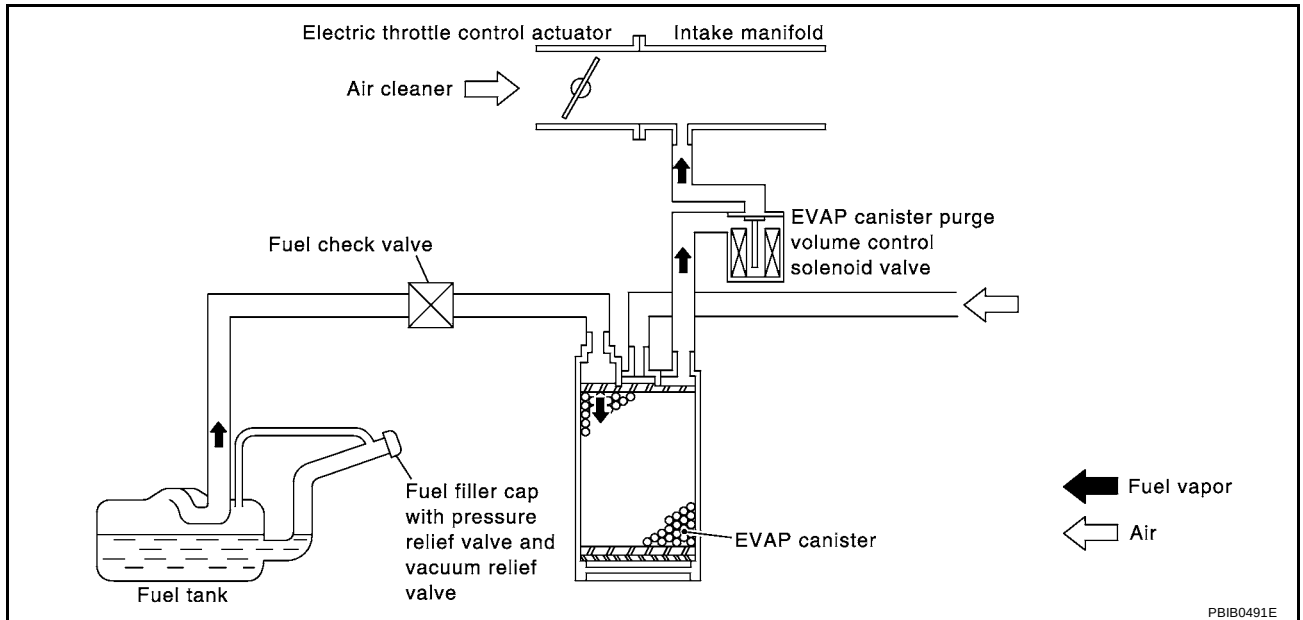
(M16) -FUSE BLOCK -JUNCTION BOX (J/B)

EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description SYSTEM DESCRIPTION

EBS000D8



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.

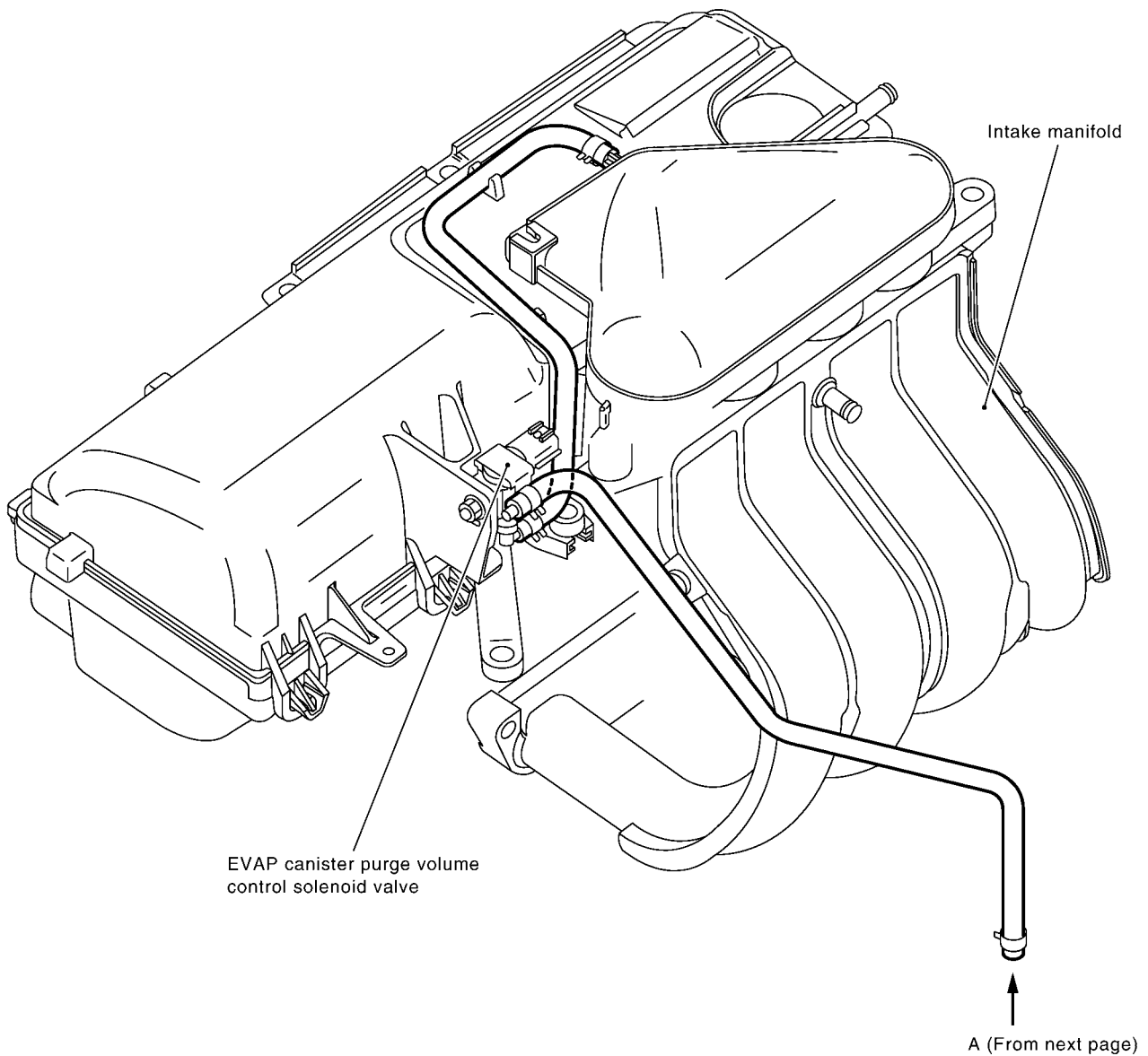
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

[CR (WITH EURO-OBD)]

EVAPORATIVE EMISSION LINE DRAWING



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

MBIB0544E

A

EC

C

D

E

F

G

H

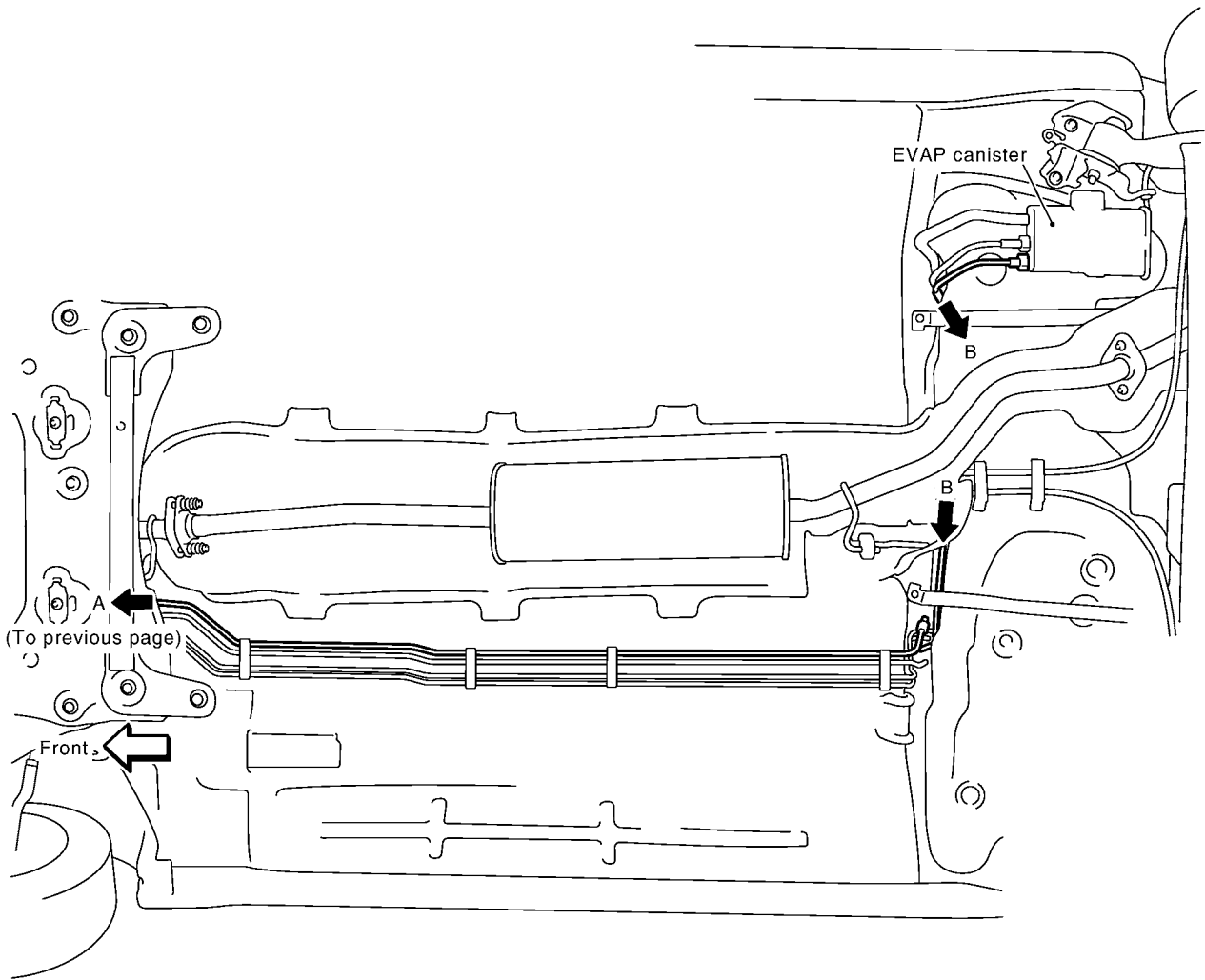
I

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L

M



MBIB0541E

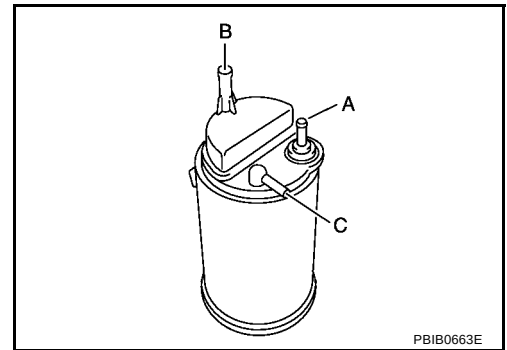
Component Inspection

EBS000D9

EVAP CANISTER

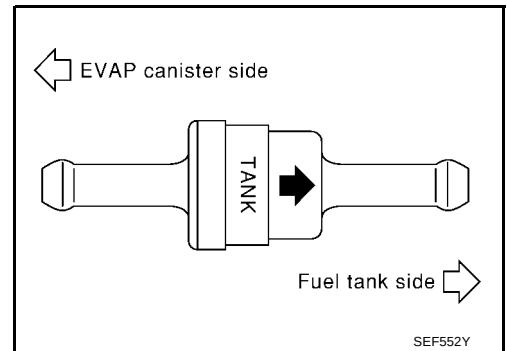
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** .
Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** .
Check that air flows freely through port **C** .



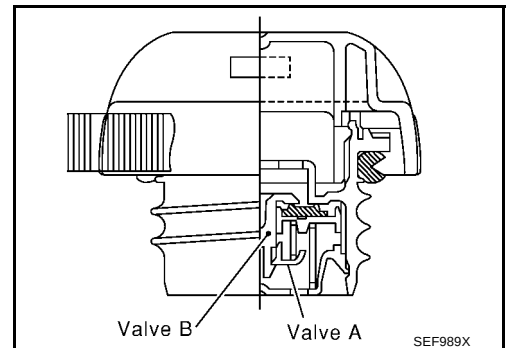
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



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

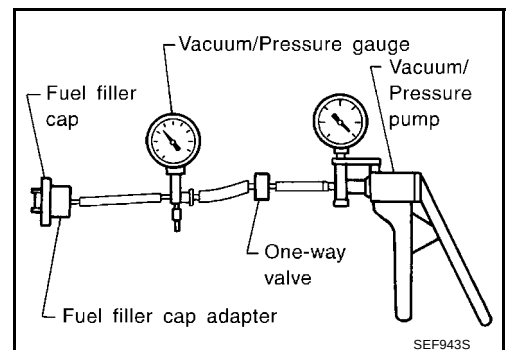
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

**Pres-
sure:** 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 -3.4 kPa (-0.060 to -0.034 bar,
-0.061 to -0.035 kg/cm² , -0.87 to -0.49 psi)

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



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-262, "Component Inspection"](#) .

POSITIVE CRANKCASE VENTILATION

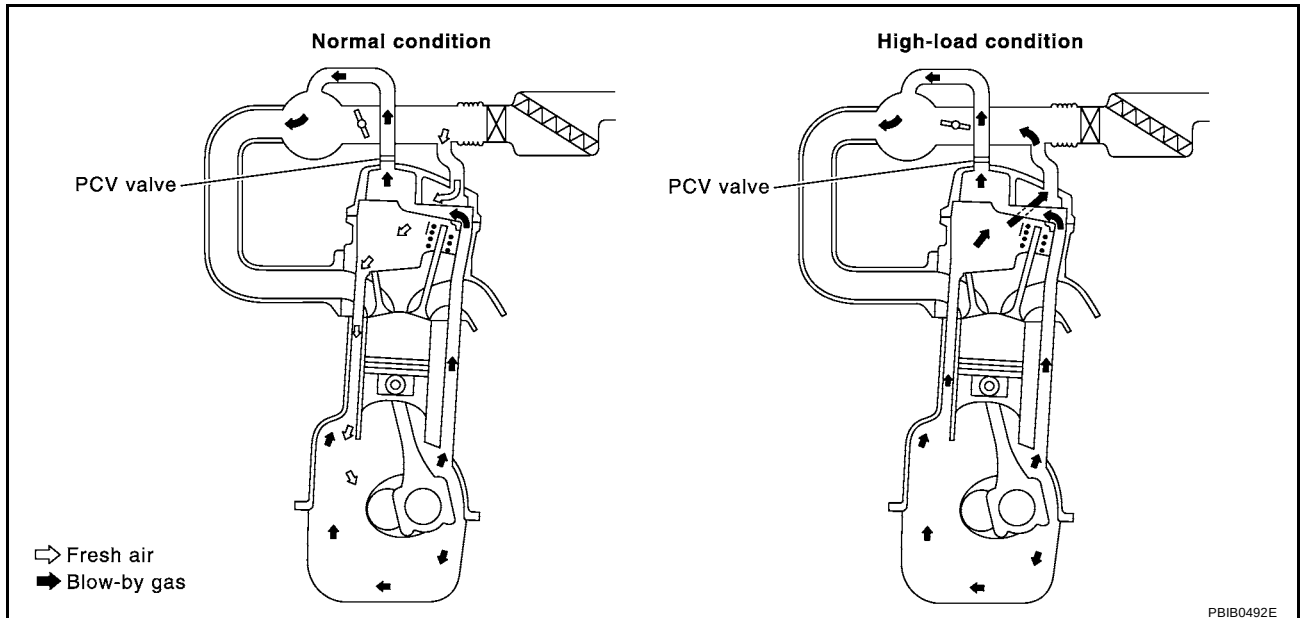
[CR (WITH EURO-OBDD)]

POSITIVE CRANKCASE VENTILATION

PFP:11810

Description SYSTEM DESCRIPTION

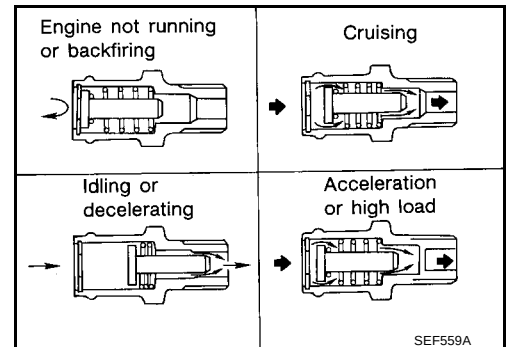
EBS000DA



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.

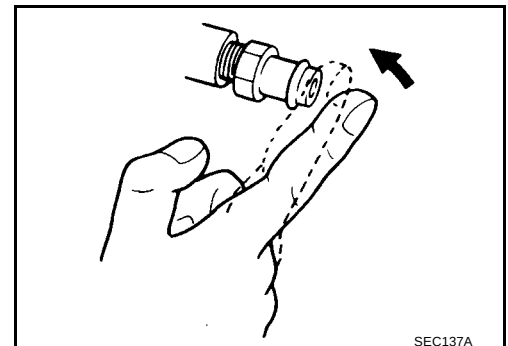


Component Inspection

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.

EBS000DB

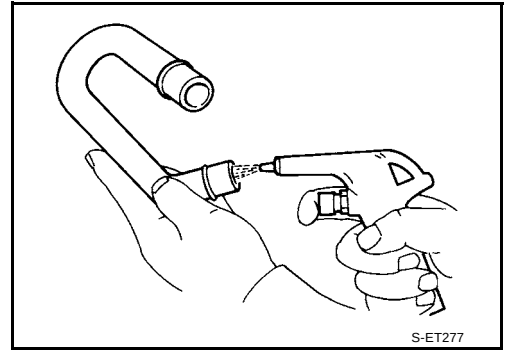


POSITIVE CRANKCASE VENTILATION

[CR (WITH EURO-OBD)]

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.



SERVICE DATA AND SPECIFICATIONS (SDS) [CR (WITH EURO-OBD)]

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

EBS000DC

Fuel pressure at idle	Approximately 350 kPa (3.5bar, 3.57kg/cm ² , 51psi)

Idle Speed and Ignition Timing

EBS000DD

Target idle speed	No-load*1 (in "P" or N" position)	M/T: 650±50 rpm A/T: 700±50 rpm
Ignition timing	In "P" or N" position	5°±5° BTDC

*1: 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

EBS000DE

	Calculated load value% (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Manifold absolute pressure sensor

EBS000DF

Supply voltage	Approximately 5.0V
Output voltage at idle	1.4 - 1.5 V*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

EBS000DG

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

EBS000DH

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

Heated Oxygen Sensor 1 Heater

EBS000DI

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Heated Oxygen sensor 2 Heater

EBS000DJ

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Crankshaft Position Sensor (POS)

EBS000DK

Refer to [EC-245, "Component Inspection"](#) .

Camshaft Position Sensor (PHASE)

EBS000DL

Refer to [EC-251, "Component Inspection"](#) .

Throttle Control Motor

EBS000DM

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

SERVICE DATA AND SPECIFICATIONS (SDS)
[CR (WITH EURO-OBD)]

Injector

EBS000DN

Resistance [at 20°C (68°F)]

12.1 - 12.9Ω

Fuel Pump

EBS000DO

Resistance [at 25°C (77°F)]

Approximately 1.0Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

EBS000JR

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the "Type approval number" on the identification plate. Refer to [GI-46, "IDENTIFICATION PLATE"](#).

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-505, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II*2	ECM*3			
ABSL PRES SEN/CIRC	P0107	0107	2	×	EC-508
ABSL PRES SEN/CIRC	P0108	0108	2	×	EC-508
APP SEN 1/CIRC	P0227	0227	1	×	EC-557
APP SEN 1/CIRC	P0228	0228	1	×	EC-557
APP SEN 2/CIRC	P1227	1227	1	×	EC-638
APP SEN 2/CIRC	P1228	1228	1	×	EC-638
APP SENSOR	P0226	0226	1	×	EC-548
BRAKE SW/CIRCUIT	P1805	1805	2	—	EC-651
CAN COMM CIRCUIT	U1000	1000*5	1	×	EC-505
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-505
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-570
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-577
CTP LEARNING	P1225	1225	2	—	EC-634
CTP LEARNING	P1226	1226	2	—	EC-636
ECM	P0605	0605	1 or 2	×	EC-584
ECM BACK UP/CIRC	P1065	1065	2	×	EC-587
ECT SEN/CIRCUIT	P0117	0117	2	×	EC-513
ECT SEN/CIRCUIT	P0118	0118	2	×	EC-513
ENG OVER TEMP	P1217	1217	1	×	EC-613
ETC ACTR	P1121	1121	1 or 2	×	EC-591
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-593
ETC MOT	P1128	1128	1	×	EC-604
ETC MOT PWR	P1124	1124	1	×	EC-599
ETC MOT PWR	P1126	1126	1	×	EC-599
HO2S1 (B1)	P0132	0132	2	×	EC-518
HO2S1 (B1)	P0134	0134	2	×	EC-524
HO2S2 (B1)	P0138	0138	2	×	EC-530
INTAKE ERROR	P1171	1171	1	×	EC-609
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-566
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-566
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-443
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	Flashing*4	EC-444
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	—

INDEX FOR DTC

[CR (WITHOUT EURO-OBDD)]

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II*2	ECM*3			
SENSOR POWER/CIRC	P1229	1229	1	×	EC-647
TP SEN 1/CIRC	P0222	0222	1	×	EC-542
TP SEN 1/CIRC	P0223	0223	1	×	EC-542
TP SEN 2/CIRC	P1223	1223	1	×	EC-628
TP SEN 2/CIRC	P1224	1224	1	×	EC-628
TP SENSOR	P0221	0221	1	×	EC-536

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

*2: These numbers are prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*4: When engine is running.

*5: The troubleshooting for these DTCs needs CONSULT-II.

DTC No. Index

EBS000JS

NOTE:

If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-505, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*4	EC-444
U1000	1000*5	CAN COMM CIRCUIT	1	×	EC-505
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-505
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	—
P0107	0107	ABSL PRES SEN/CIRC	2	×	EC-508
P0108	0108	ABSL PRES SEN/CIRC	2	×	EC-508
P0117	0117	ECT SEN/CIRCUIT	2	×	EC-513
P0118	0118	ECT SEN/CIRCUIT	2	×	EC-513
P0132	0132	HO2S1 (B1)	2	×	EC-518
P0134	0134	HO2S1 (B1)	2	×	EC-524
P0138	0138	HO2S2 (B1)	2	×	EC-530
P0221	0221	TP SENSOR	1	×	EC-536
P0222	0222	TP SEN 1/CIRC	1	×	EC-542
P0223	0223	TP SEN 1/CIRC	1	×	EC-542
P0226	0226	APP SENSOR	1	×	EC-548
P0227	0227	APP SEN 1/CIRC	1	×	EC-557
P0228	0228	APP SEN 1/CIRC	1	×	EC-557
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-566
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-566
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-570
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-577
P0605	0605	ECM	1 or 2	×	EC-584
P1065	1065	ECM BACK UP/CIRC	2	×	EC-587
P1121	1121	ETC ACTR	1 or 2	×	EC-591

INDEX FOR DTC

[CR (WITHOUT EURO-OBD)]

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II*2	ECM*3				
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-593
P1124	1124	ETC MOT PWR	1	×	EC-599
P1126	1126	ETC MOT PWR	1	×	EC-599
P1128	1128	ETC MOT	1	×	EC-604
P1171	1171	INTAKE ERROR	1	×	EC-609
P1217	1217	ENG OVER TEMP	1	×	EC-613
P1223	1223	TP SEN 2/CIRC	1	×	EC-628
P1224	1224	TP SEN 2/CIRC	1	×	EC-628
P1225	1225	CTP LEARNING	2	—	EC-634
P1226	1226	CTP LEARNING	2	—	EC-636
P1227	1227	APP SEN 2/CIRC	1	×	EC-638
P1228	1228	APP SEN 2/CIRC	1	×	EC-638
P1229	1229	SENSOR POWER/CIRC	1	×	EC-647
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EC-443
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-651

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

*2: These numbers are prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*4: When engine is running.

*5: The troubleshooting for these DTCs needs CONSULT-II.

PRECAUTIONS

PFP:00001

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

EBS000S4

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 SRS and SB section 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 SRS section.
- 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 harness connectors.

Maintenance Information

EBS00R4Y

If any of following part is replaced, always replace with new* one.

If it's not (or fail to do so), the electrical system may not be operated properly.

*: New one means a virgin control unit that has never been energized on-board.

RHD MODELS

- BCM (Models without Intelligent Key system)
- Intelligent Key unit (Models with Intelligent Key system)
- ECM
- IPDM E/R
- Combination meter
- EPS control unit

LHD MODELS

- BCM (Models without Intelligent Key system)
- Intelligent Key unit (Models with Intelligent Key system)
- ECM

On Board Diagnostic (OBD) System of Engine and A/T

EBS00OJU

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:

- Be sure to turn the ignition switch OFF and disconnect the battery ground 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.
- Be sure 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-81, "HARNESS CONNECTOR"](#).
- Be sure 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.
- Be sure 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 injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM.

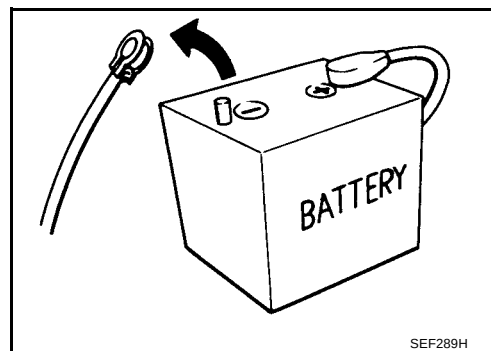
PRECAUTIONS

[CR (WITHOUT EURO-OBD)]

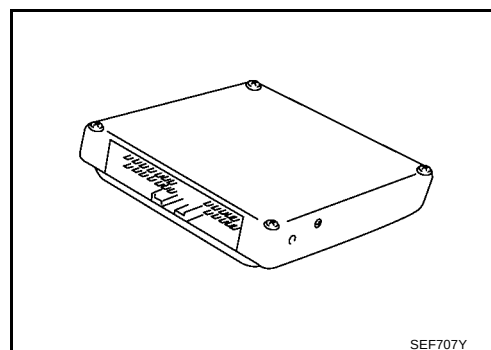
Precaution

EBS000JV

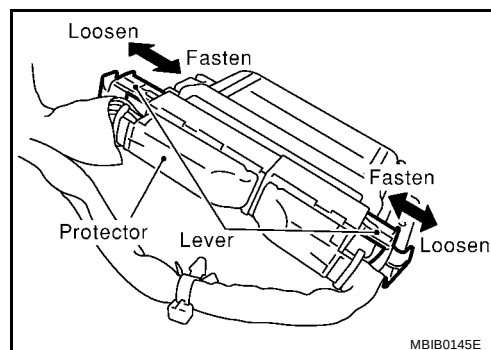
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage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



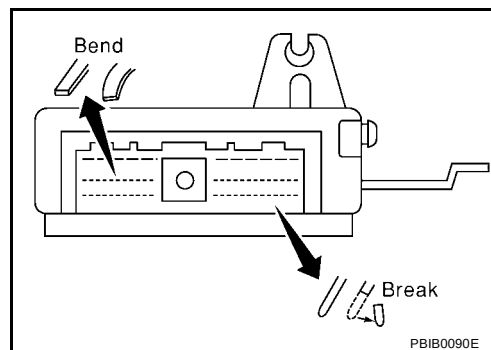
- Do not disassemble ECM.
- If battery cable is disconnected, the memory will return to the initial ECM values. The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.



- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown at right.



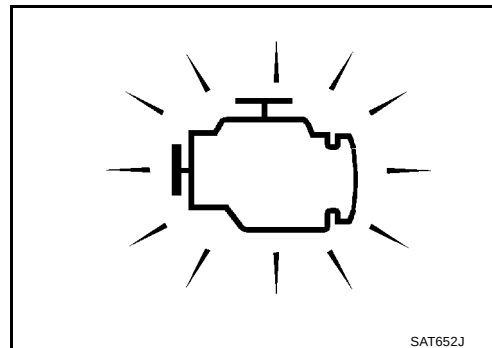
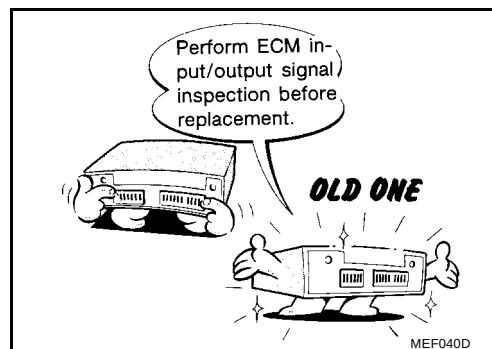
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely 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.



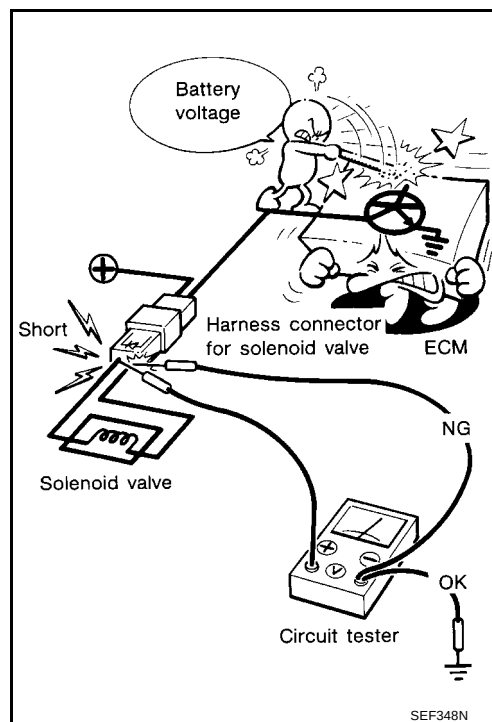
PRECAUTIONS

[CR (WITHOUT EURO-OBD)]

- Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to [EC-470, "ECM Terminals and Reference Value"](#).
- Handle manifold absolute pressure sensor carefully to avoid damage.
- Do not clean air clear element 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.



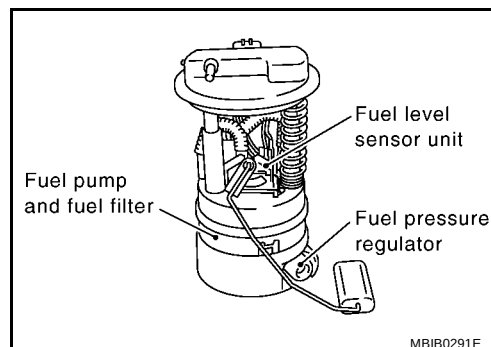
- When measuring ECM signals with a circuit tester, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
Accidental contact of probes will cause a short circuit 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.



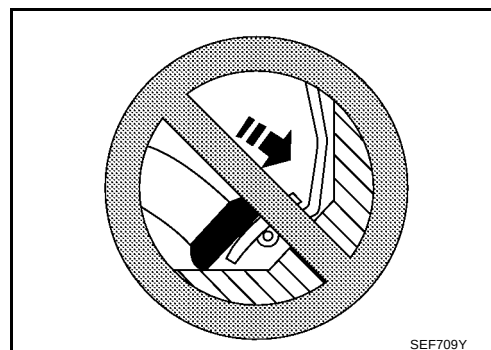
PRECAUTIONS

[CR (WITHOUT EURO-OBD)]

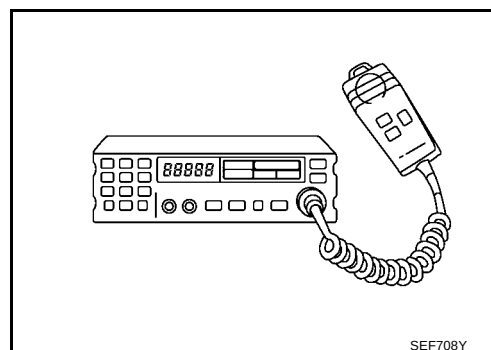
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



- 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.



Wiring Diagrams and Trouble Diagnosis

EBS000JW

When you read wiring diagrams, refer to the following:

- [GI-14, "How to Read Wiring Diagrams"](#)
- [PG-4, "POWER SUPPLY ROUTING"](#) for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- [GI-11, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"](#)
- [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#)

PREPARATION

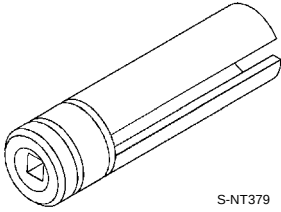
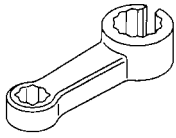
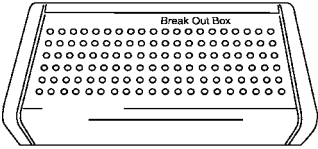
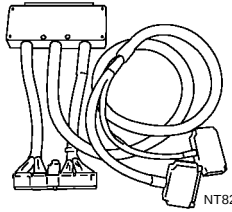
[CR (WITHOUT EURO-OBD)]

PREPARATION

PFP:00002

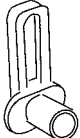
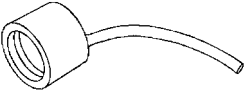
Special Service Tools

EBS000JX

Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors a: 22 mm (0.87 in)
KV109E0010 Break-out box	 NT825	Measuring ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 NT826	Measuring ECM signals with a circuit tester

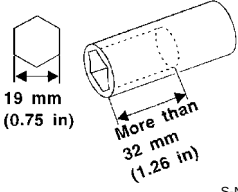
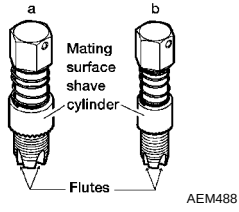
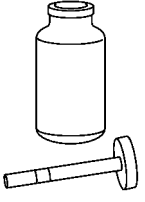
Commercial Service Tools

EBS000JY

Tool name	Description	
Quick connector release	 PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter	 S-NT653	Checking fuel tank vacuum relief valve opening pressure

PREPARATION

[CR (WITHOUT EURO-OBD)]

Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 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.

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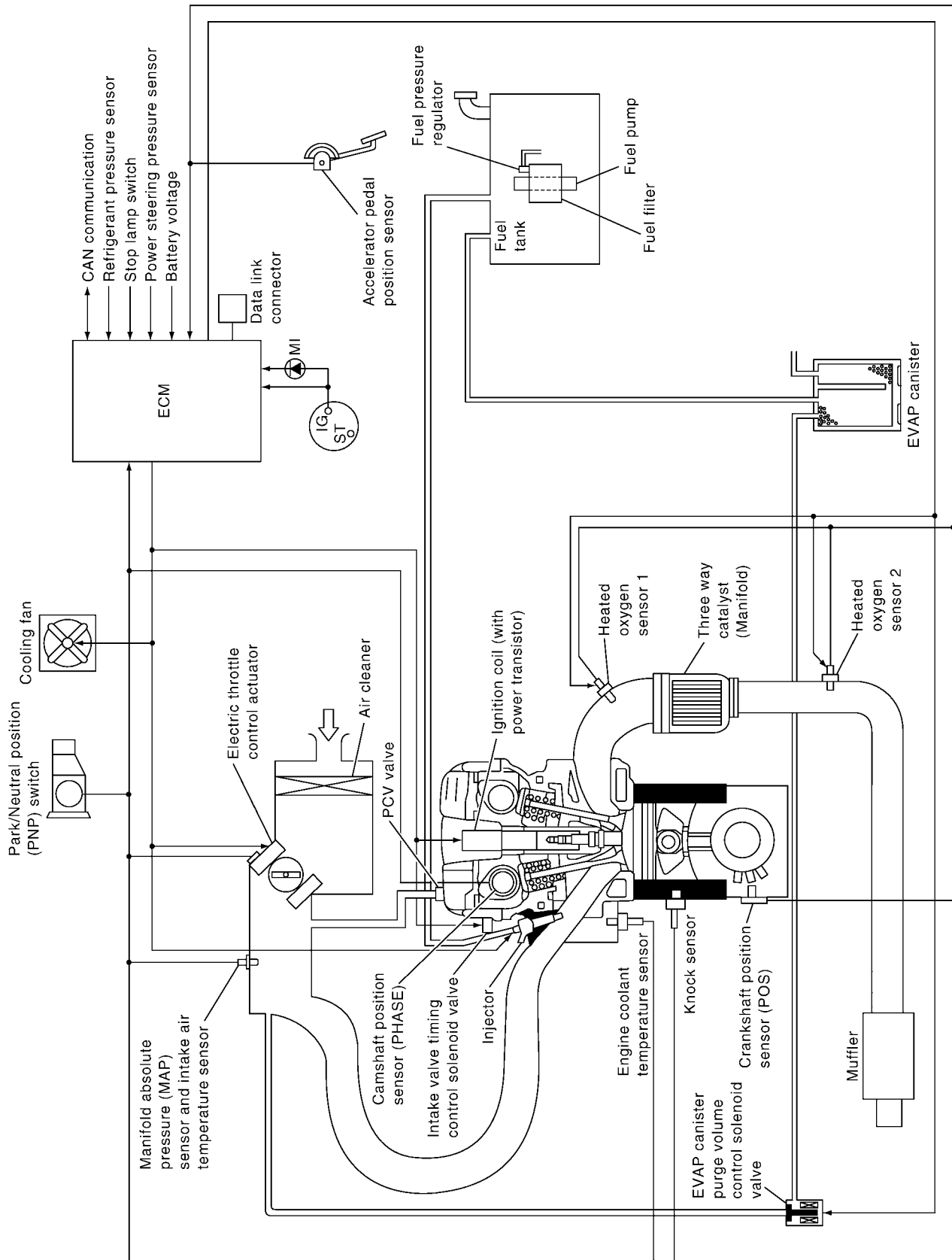
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ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

EBS000JZ



MBIB0266E

Vacuum Hose Drawing

EBS000K0

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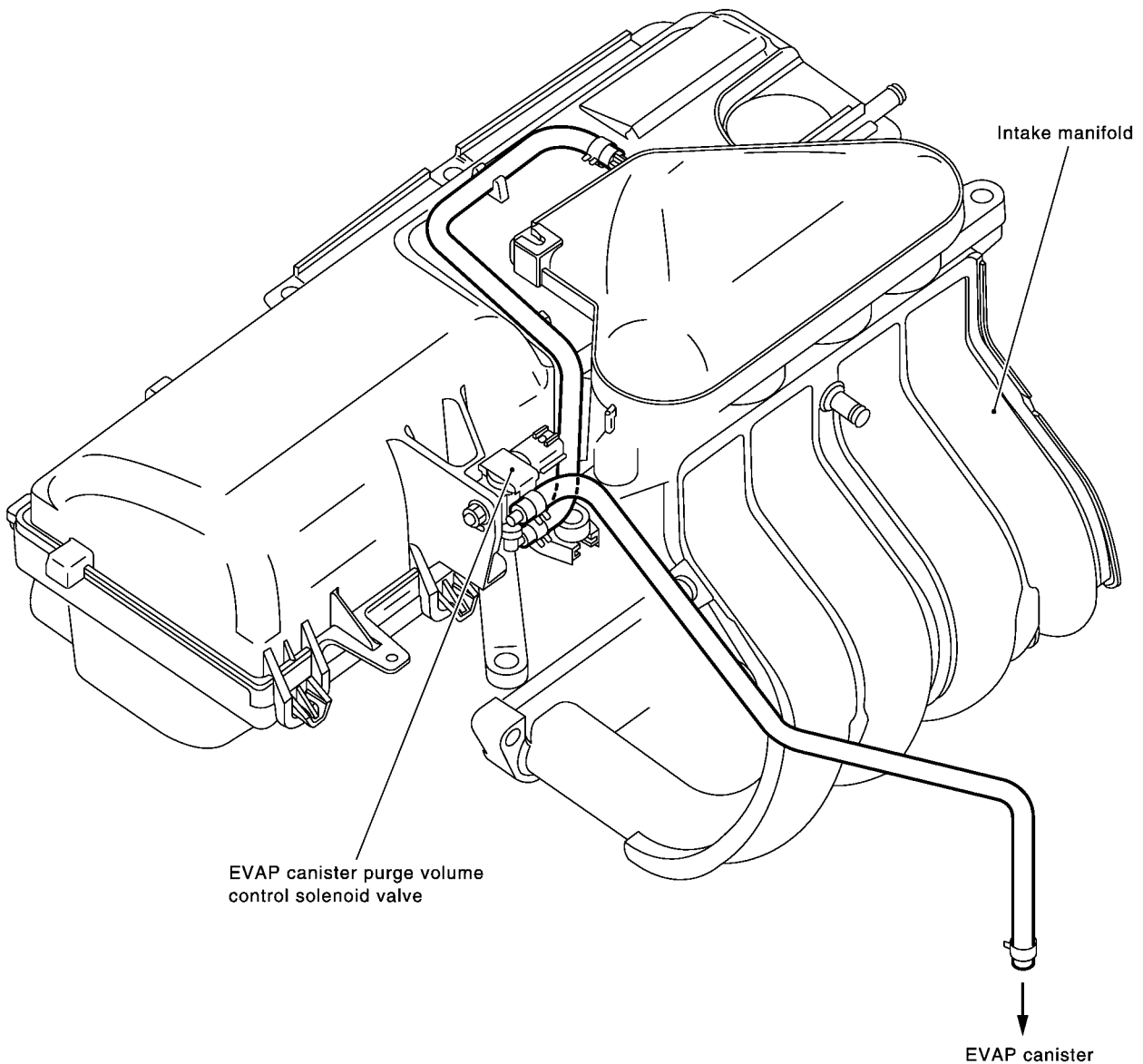
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NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

Refer to [EC-422, "System Diagram"](#) for Vacuum Control System.

MBIB0265E

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

System Chart

EBS000K1

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Manifold absolute pressure sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Stop lamp switch ● Heated oxygen sensor 2 *¹ ● TCM (Transmission control module) ● ABS control unit*² ● Air conditioner switch*² ● Vehicle speed signal*² ● Electrical load signal*²	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	Idle speed control	Electric throttle control actuator
	On board diagnostic system	MI (On the instrument panel)
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay * ³
	Cooling fan control	Cooling fan relays * ³

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

*2: These input signals are sent to the ECM through CAN communication line.

*3: These output signals are sent from the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System INPUT/OUTPUT SIGNAL CHART

EBS000K2

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed * ³ and piston position	Fuel injection & mixture ratio control	Fuel injectors
Manifold absolute pressure sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage * ³		
Heated oxygen sensor 2 * ¹	Density of oxygen in exhaust gas		
Vehicle speed signal * ²	Vehicle speed		
Air conditioner switch * ²	Air conditioner operation		

*1: Under normal conditions, this sensor is not for engine control operation.

*2: These signals are 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 volume) from the crankshaft position sensor, the manifold absolute pressure sensor and intake air temperature 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.

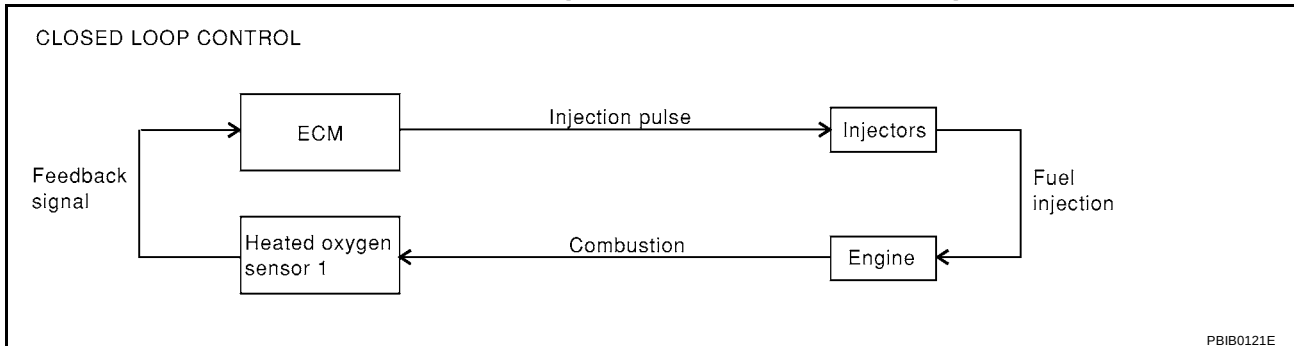
<Fuel increase>

- 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 heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to [EC-518](#). 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 heated oxygen 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 heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen 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 heated oxygen 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 orig-

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

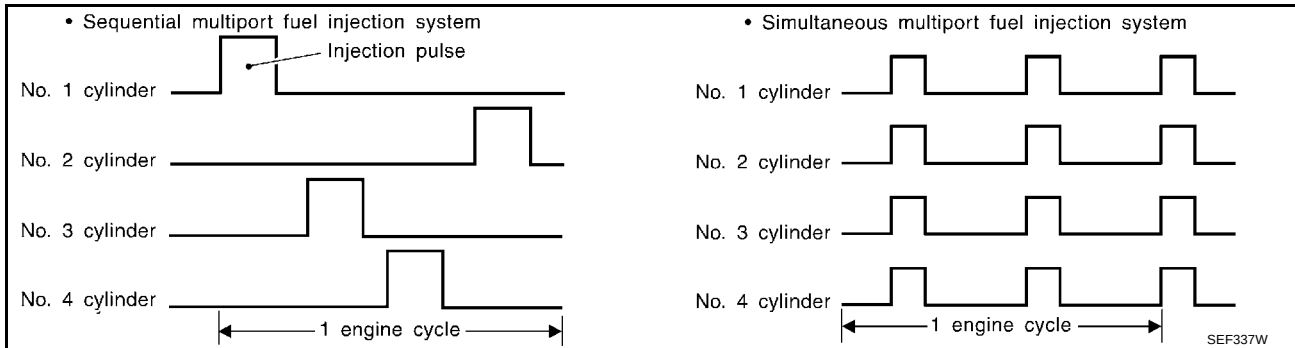
inally designed. Both manufacturing differences (i.e., manifold absolute pressure sensor silicon diaphragm) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio. Accordingly, the difference between the basic and theoretical mixture ratios is monitored in 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 heated oxygen 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 four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The four 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.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System INPUT/OUTPUT SIGNAL CHART

EBS000K3

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed *2 and piston position	Ignition timing control	Power transistor
manifold absolute pressure 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		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage *2		
Vehicle speed signal *1	Vehicle speed		

*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

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. This data forms the map shown.

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.

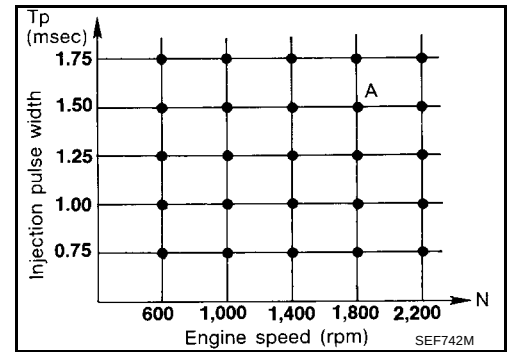
e.g., N: 1,800 rpm, Tp: 1.50 msec

A °BTDC

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.



Air Conditioning Cut Control INPUT/OUTPUT SIGNAL CHART

EBS000K4

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch *1	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed *2		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Vehicle speed signal *1	Vehicle speed		
Battery	Battery voltage		

*1: These signals are 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

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 engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

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

EBS000K5

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injectors
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed signal* ¹	Vehicle speed		

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

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed 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 operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", [EC-424](#).

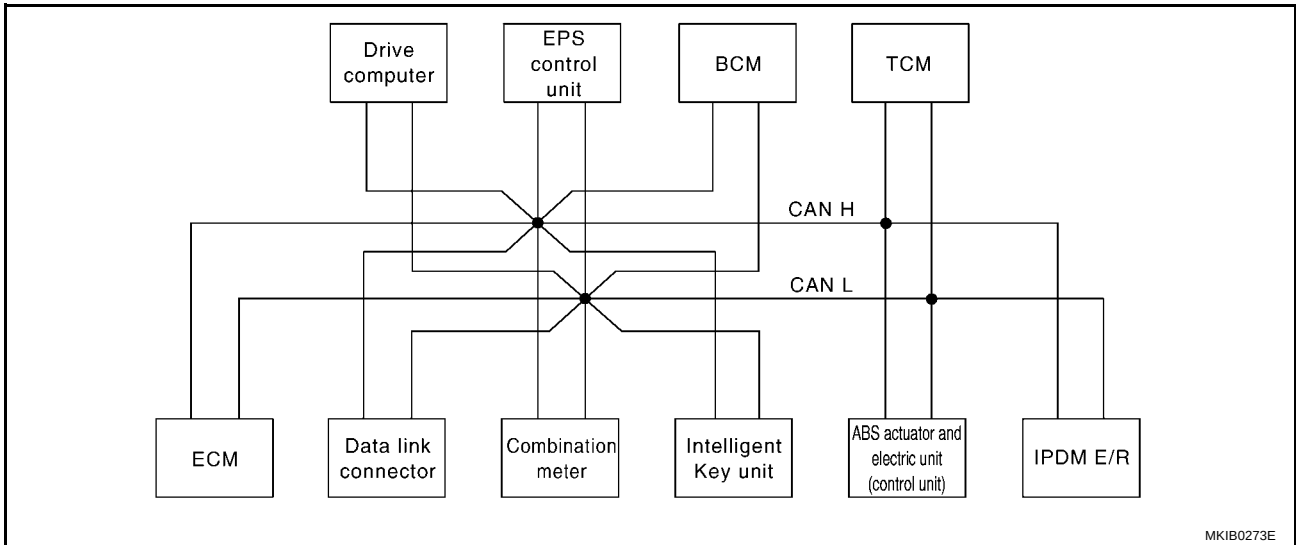
CAN Communication Unit SYSTEM DESCRIPTION

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.

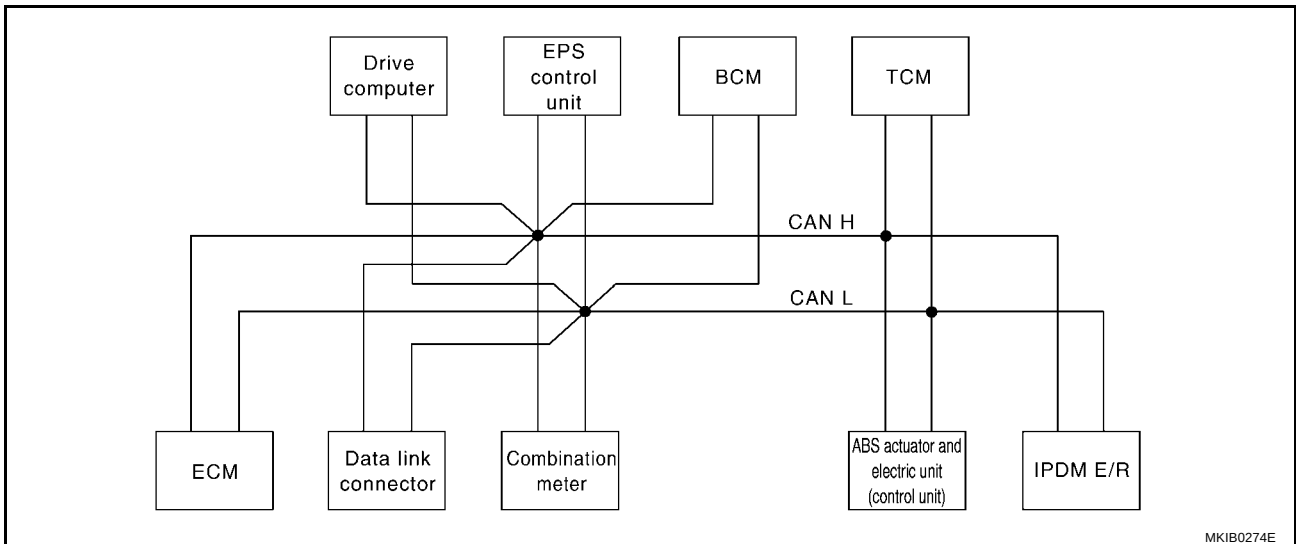
A/T MODELS

System diagram

- Models with Intelligent Key system



- Models without Intelligent Key system



Input/output signal chart

T: Transmit R: Receive

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

Signals	ECM	Combination meter.	Intelligent Key unit	Drive computer	EPS control unit	BCM	ABS actuator and electric unit (control unit)	TCM	IPDM E/R
Engine speed signal	T	R		R	R				
Engine coolant temperature signal	T	R							
A/T self-diagnosis signal	R							T	
Output shaft revolution signal	R							T	
Accelerator pedal position signal	T							R	
Closed throttle position signal	T							R	
Wide open throttle position signal	T							R	
A/T shift position signal		R						T	
Stop lamp switch signal		T						R	
O/D OFF indicator lamp signal		R						T	
Engine and A/T integrated control signal	T							R	
	R							T	
Fuel consumption monitor signal	T	R							
Oil pressure switch signal		R		R					T
A/C compressor request signal	T								R
Heater fan switch signal	R					T			
Cooling fan speed request signal	T								R
Cooling fan speed status signal	R								T
Position lights request signal		R		R		T			R
Position light status signal	R								T
Low beam request signal						T			R
Low beam status signal	R								T
High beam request signal		R				T			R
High beam status signal	R								T
Day time light request signal						T			R
Vehicle speed signal	R	R			R		T		
	R	T	R	R	R	R			
Sleep/wake up signal		R	R			T			R
Door switch signal		R	R	R		T			R
Turn indicator signal		R				T			
Buzzer output signal		R				T			
		R	T						
MI signal	T	R		R					
Front wiper request signal						T			R
Front wiper stop position signal						R			T
Rear window defogger switch signal						T			R
Rear window defogger control signal	R								T
Drive computer signal		T		R					

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

Signals	ECM	Combination meter.	Intelligent Key unit	Drive computer	EPS control unit	BCM	ABS actuator and electric unit (control unit)	TCM	IPDM E/R
EPS warning lamp signal		R		R	T				
ABS warning lamp signal		R		R			T		
ABS operation signal	R						T		
Brake warning lamp signal		R		R			T		
Buck-up lamp signal					R	T			
Fuel low warning signal		T		R					
Battery charge malfunction signal		T		R					
Air bag system warning signal		T		R					
Brake fluid level warning signal		T		R					
Engine coolant temperature warning signal		T		R					
Front fog lamp request signal		R				T			R
Rear fog lamp status signal		R				T			
Headlamp washer request signal						T			R
Door lock/unlock request signal			R			T			
Door lock/unlock status signal			R			T			
KEY indicator signal		R	T						
LOCK indicator signal		R	T						

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[CR (WITHOUT EURO-OBD)]

System diagram

-
- The diagram illustrates the CAN bus system architecture. At the top, three control units are connected to the CAN H and CAN L lines: the Drive computer, EPS control unit, and BCM. At the bottom, four control units are connected to the CAN H and CAN L lines: the ECM, Data link connector, Combination meter, and Intelligent Key unit. The ABS actuator and electric unit (control unit) and the IPDM E/R are also connected to the CAN H and CAN L lines. The CAN H line is labeled 'CAN H' and the CAN L line is labeled 'CAN L'. The diagram shows the physical wiring connections between the control units and the bus lines.

-
- The diagram illustrates the CAN bus system architecture. At the top, three components are connected to the CAN H and CAN L lines: the Drive computer, EPS control unit, and BCM. At the bottom, five components are connected to the same lines: the ECM, Data link connector, Combination meter, ABS actuator and electric unit (control unit), and IPDM E/R. The CAN H line is the upper line, and the CAN L line is the lower line. The connections are as follows:
- Drive computer:** Connected to CAN H and CAN L.
 - EPS control unit:** Connected to CAN H and CAN L.
 - BCM:** Connected to CAN H and CAN L.
 - ECM:** Connected to CAN H and CAN L.
 - Data link connector:** Connected to CAN H and CAN L.
 - Combination meter:** Connected to CAN H and CAN L.
 - ABS actuator and electric unit (control unit):** Connected to CAN H and CAN L.
 - IPDM E/R:** Connected to CAN H and CAN L.

T: Transmit R: Receive

Signals	ECM	Combina- tion meter.	Intelli- gent Key unit	Drive computer	EPS con- trol unit	BCM	ABS actuator and elec- tric unit (control unit)	IPDM E/ R
Engine speed signal	T	R		R	R			
Engine coolant temperature signal	T	R						
Fuel consumption monitor signal	T	R						
Oil pressure switch signal		R		R				T
A/C compressor request signal	T							R
Heater fan switch signal	R					T		
Cooling fan speed request signal	T							R
Cooling fan speed status signal	R							T
Position lights request signal		R		R		T		R

ENGINE CONTROL SYSTEM

[CR (WITHOUT EURO-OBD)]

Signals	ECM	Combina- tion meter.	Intelli- gent Key unit	Drive computer	EPS con- trol unit	BCM	ABS actuator and elec- tric unit (control unit)	IPDM E/ R
Position light status signal	R							T
Low beam request signal						T		R
Low beam status signal	R							T
High beam request signal		R				T		R
High beam status signal	R							T
Day time light request signal						T		R
Vehicle speed signal	R	R			R		T	
	R	T	R	R	R	R		
Sleep/wake up signal		R	R			T		R
Door switch signal		R	R	R		T		R
Turn indicator signal		R				T		
Buzzer output signal		R				T		
		R	T					
MI signal	T	R		R				
Front wiper request signal						T		R
Front wiper stop position signal						R		T
Rear window defogger switch signal						T		R
Rear window defogger control sig- nal	R							T
Drive computer signal		T		R				
EPS warning indicator signal		R		R	T			
ABS warning lamp signal		R		R			T	
ABS operation signal	R			R			T	
Brake warning lamp signal		R					T	
Buck-up lamp signal					R	T		
Fuel low warning signal		T		R				
Battery charge malfunction signal		T		R				
Air bag system warning signal		T		R				
Brake fluid level warning signal		T		R				
Engine coolant temperature warn- ing signal		T		R				
Front fog lamp request signal		R				T		R
Rear fog lamp status signal		R				T		
Headlamp washer request signal						T		R
Door lock/unlock request signal			R			T		
Door lock/unlock status signal			R			T		
KEY indicator signal		R	T					
LOCK indicator signal		R	T					

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BASIC SERVICE PROCEDURE

PFP:00018

Idle Speed and Ignition Timing Check

IDLE SPEED

EBS000K7

① With CONSULT-II

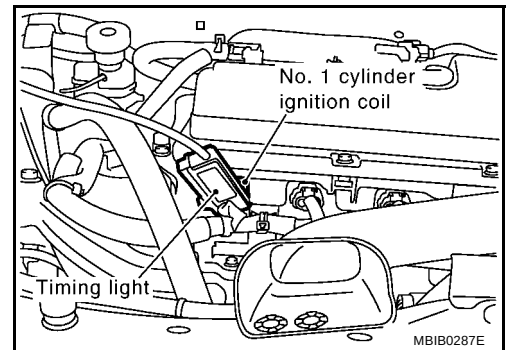
Check idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

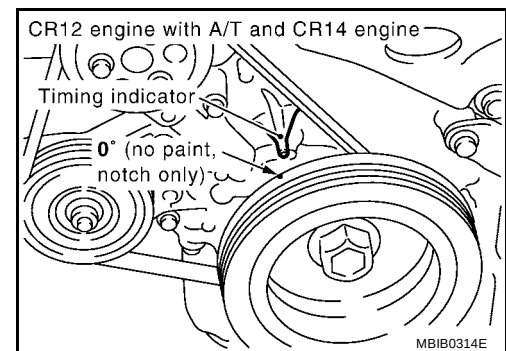
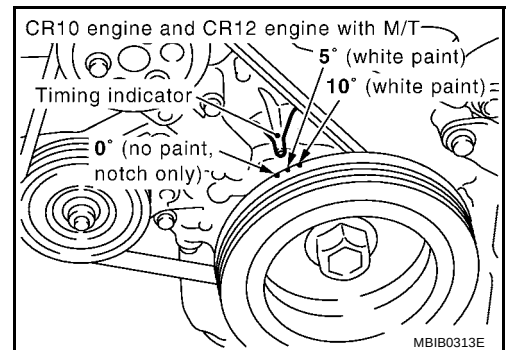
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IGNITION TIMING

1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the wires as shown in the figure.



3. Check ignition timing.



Accelerator Pedal Released Position Learning

EBS000K8

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" wait at least 10 seconds.
4. Turn ignition switch "ON" and wait at least 2 seconds.
5. Turn ignition switch "OFF" wait at least 10 seconds.

Throttle Valve Closed Position Learning

EBS000K9

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

EBS000KA

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 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)
On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

OPERATION PROCEDURE**Ⓟ With CONSULT-II**

1. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-435, "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.

BASIC SERVICE PROCEDURE

[CR (WITHOUT EURO-OBD)]

- Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.

SELECT WORK ITEM
XXXXXXXXXX
XXXXXXXXXX
IDLE AIR VOL LEARN
XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX

SEF217Z

- Touch "START" and wait 20 seconds.

WORK SUPPORT	
IDLE AIR VOL LEARN	
MONITOR	
ENG SPEED	XXX rpm
START	

SEF454Y

- Make sure that "CMPLT" is not displayed on CONSULT-II screen. If "INCMP" is 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.
- Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

WORK SUPPORT	
IDLE AIR VOL LEARN	CMPLT
MONITOR	
ENG SPEED	XXX rpm
START	

MBIB0238E

ITEM	SPECIFICATION
Idle speed	M/T: 650±50 rpm A/T: 700±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 5±5° BTDC A/T: 5±5° BTDC (in "P" or "N" position)

⊗ Without CONSULT-II

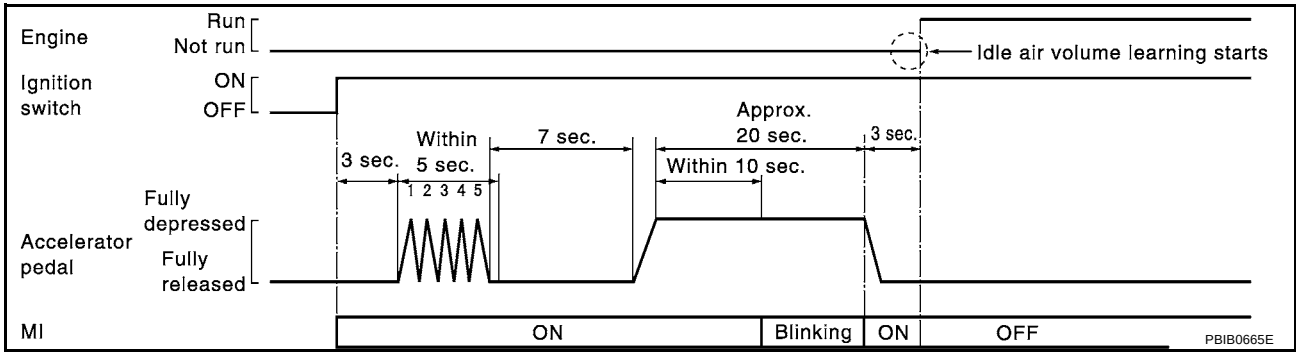
NOTE:

- 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.
- Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
 - Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
 - Start engine and warm it up to normal operating temperature.
 - Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.
 - Turn ignition switch "OFF" and wait at least 10 seconds.
 - Confirm that accelerator pedal is fully released, turn ignition switch "ON" and wait 3 seconds.
 - Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
 - Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
 - Fully release the accelerator pedal within 3 seconds after the MI goes off.
 - Start engine and let it idle.

BASIC SERVICE PROCEDURE

[CR (WITHOUT EURO-OBD)]

- Wait 20 seconds.



- 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: 650±50 rpm A/T: 700±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 5±5° BTDC A/T: 5±5° BTDC (in "P" or "N" position)

- 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:

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.
- 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-494, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#).
- 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

FUEL PRESSURE RELEASE

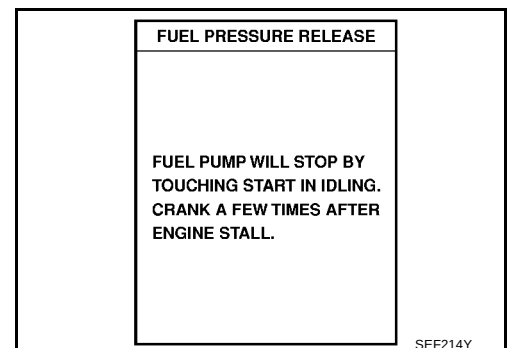
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

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

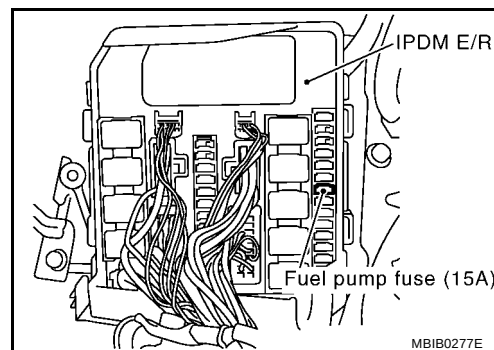
Ⓟ With CONSULT-II

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



⊗ Without CONSULT-II

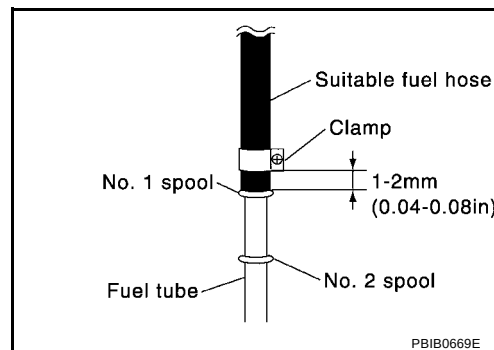
1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF".
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

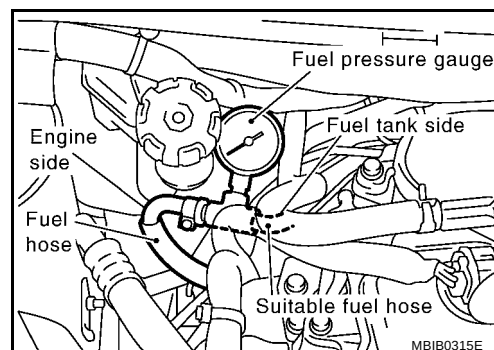
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
 - Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.
 - When installing fuel hose quick connector, refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .
1. Release fuel pressure to zero. Refer to [EC-437, "FUEL PRESSURE RELEASE"](#) .
 2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
 - 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-14, "AIR CLEANER AND AIR DUCT"](#) .
 - Do not twist or kink fuel hose because it is plastic hose.
 - Do not remove fuel hose from quick connector.
 - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
 4. Install the fuel pressure gauge as shown in the figure.
 - 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 and No.1 spool.
 - 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.
 - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
 - 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. 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.
 6. Turn ignition switch "ON", and check for fuel leakage.
 7. Start engine and check for fuel leakage.



BASIC SERVICE PROCEDURE

[CR (WITHOUT EURO-OBD)]

8. 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.

A

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

EC

9. If result is unsatisfactory, go to next step.

C

10. Check the following.

- Fuel hoses and fuel tubes for clogging
- Fuel filter for clogging
- Fuel pump
- Fuel pressure regulator for clogging

D

If OK, replace fuel pressure regulator.

E

If NG, repair or replace.

F

G

H

I

J

K

L

M

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS000KC

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-II	×	×	×	×
ECM	×	×*	—	—

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

The malfunction indicator (MI) 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-452](#).)

Two Trip Detection Logic

EBS000KD

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 MI 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 MI lights up. The MI 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 there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up when there is a 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 has malfunction and MI circuit is open by means of operating fail-safe function.

The fail-safe function also operate when above diagnoses except MI circuit 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
DTC AND 1ST TRIP DTC

EBS000KE

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 MI 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 MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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, 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 [EC-442, "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 II, refer to [EC-448, "WORK FLOW"](#). Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

How to Read DTC and 1st Trip DTC

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

With CONSULT-II

CONSULT-II displays the DTC in “SEFL-DIAG RESULTS” mode. Examples: P0117, P0340, P1065, etc. (CONSULT-II also displays the malfunctioning component or system.)

Without CONSULT-II

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0107, 0340 etc.

- **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-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II 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-II. 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]”.

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS	TIME		DTC RESULTS	TIME
	CKP SEN/CIRCUIT [P0335]	0		CKP SEN/CIRCUIT [P0335]	1t

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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-II. For details, see [EC-481, "Freeze Frame Data and 1st Trip Freeze Frame Data"](#).

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/MI 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 [EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

📖 How to Erase DTC (With CONSULT-II)

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

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. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

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” again.

SELECT SYSTEM
ENGINE

2. Turn **CONSULT-II** “ON” and touch “ENGINE”.



SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
ECM PART NUMBER

3. Touch “SELF-DIAG RESULTS”.



SELF DIAG RESULTS	
DTC RESULTS	TIME
ABSL PRES SEN/CIRC [P0107]	0

4. Touch “ERASE”. (The DTC in the ECM will be erased.)

MBIB0657E

⊗ How to Erase DTC (Without CONSULT-II)

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-444, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#) .
- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 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
 - Others

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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

NATS (Nissan Anti-theft System)

EBS000KF

- 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-II using NATS program card. Refer to [BL-201, "NATS\(Nissan Anti-Theft System\)"](#).
- Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.
- When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF515Y

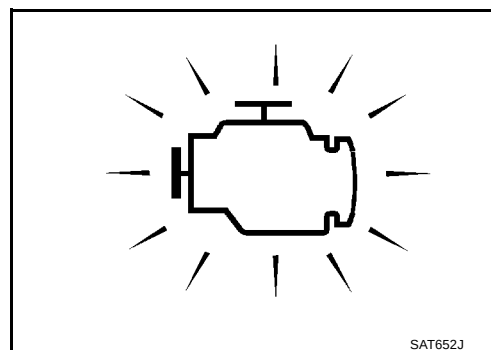
Malfunction Indicator (MI)

DESCRIPTION

EBS000KG

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.
- If the MI does not light up, refer to [DI-48, "WARNING LAMPS"](#) or see [EC-729](#).
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.



SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four 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 malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • "One trip detection diagnoses"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode II	Ignition switch in "ON" position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up 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 has a malfunction and MI circuit is open by means of operating fail-safe function.

The fail-safe function also operate when above diagnoses except MI circuit and demands the driver to repair the a malfunction.

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

MI Flashing without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. [EC-444, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#).

How to switch the diagnostic test (function) modes, and details of the above functions are described later, [EC-444, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#).

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
- Others

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".

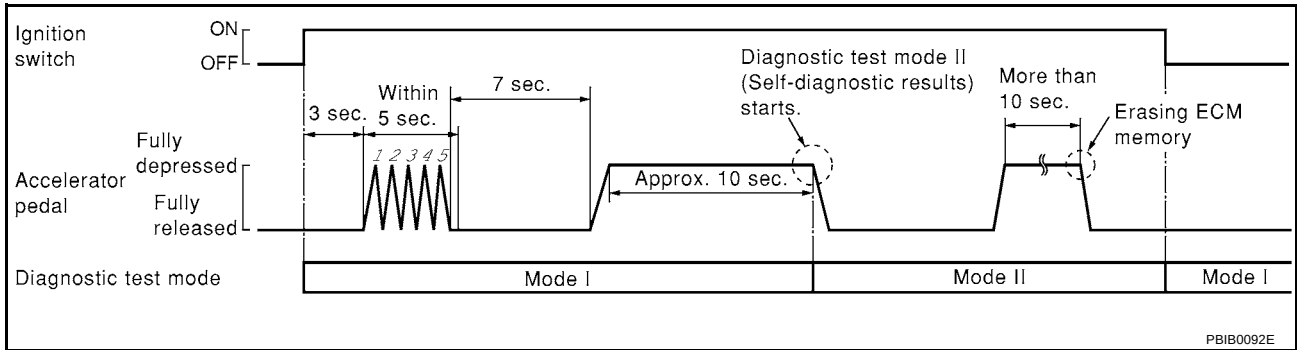
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

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 MI starts blinking.
4. Fully release the accelerator pedal.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

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



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to [EC-444, "How to Set Diagnostic Test Mode II \(Self-diagnostic Results\)"](#).
2. Start Engine.
ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to [EC-444, "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 MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [DI-48, "WARNING LAMPS"](#) or see [EC-729](#).

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

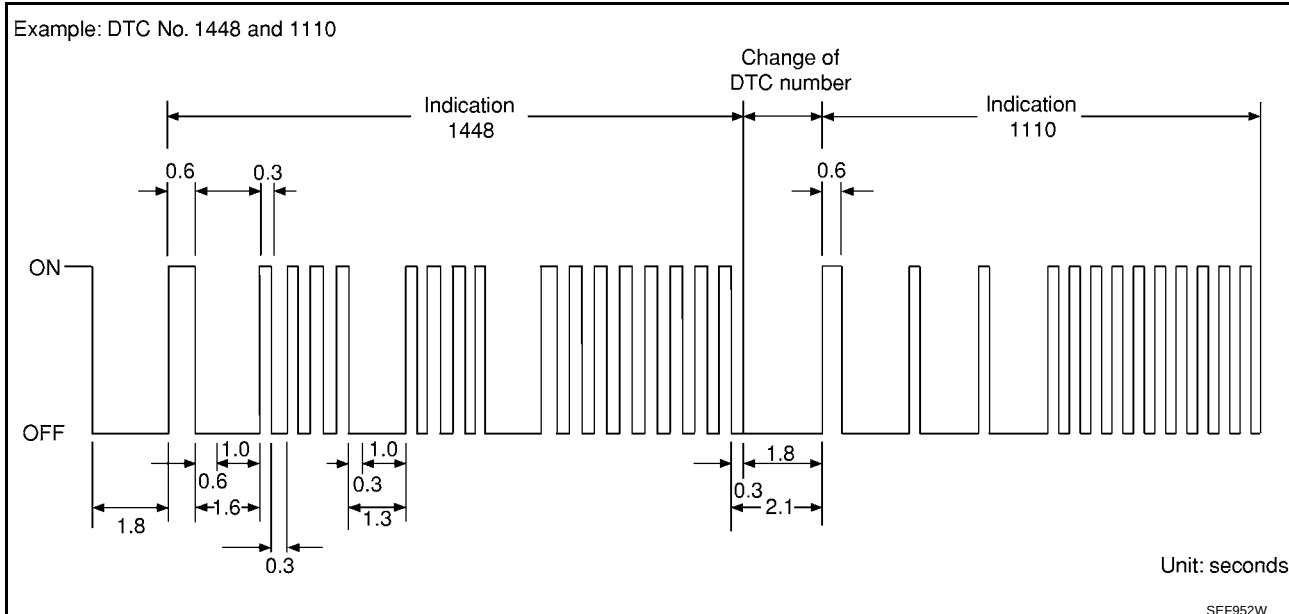
DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st 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 illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are dis-

ON BOARD DIAGNOSTIC (OBD) SYSTEM

[CR (WITHOUT EURO-OBD)]

played, 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-II. 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.

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-413, "INDEX FOR DTC"](#))

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 [EC-444, "HOW TO SWITCH DIAGNOSTIC TEST MODE"](#) .

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

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air-fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

TROUBLE DIAGNOSIS

PFP:00004

EBS000K1

Trouble Diagnosis Introduction

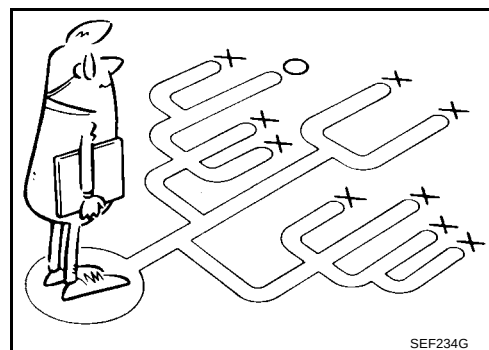
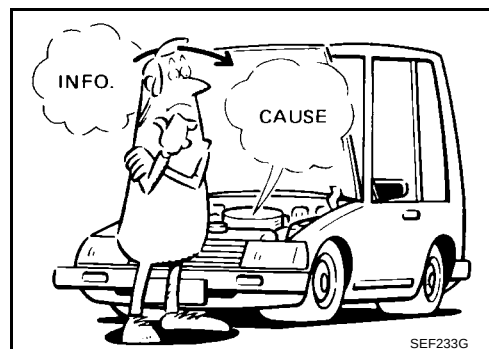
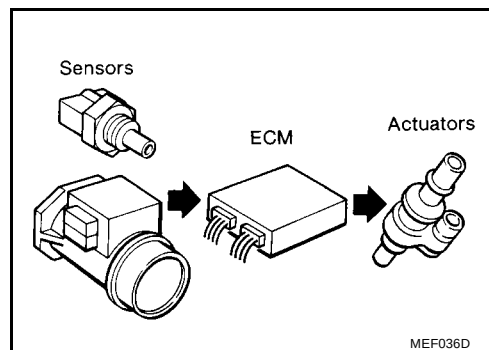
INTRODUCTION

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 a 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-II or a circuit tester connected should be performed. Follow the "Work Flow" on [EC-448](#).

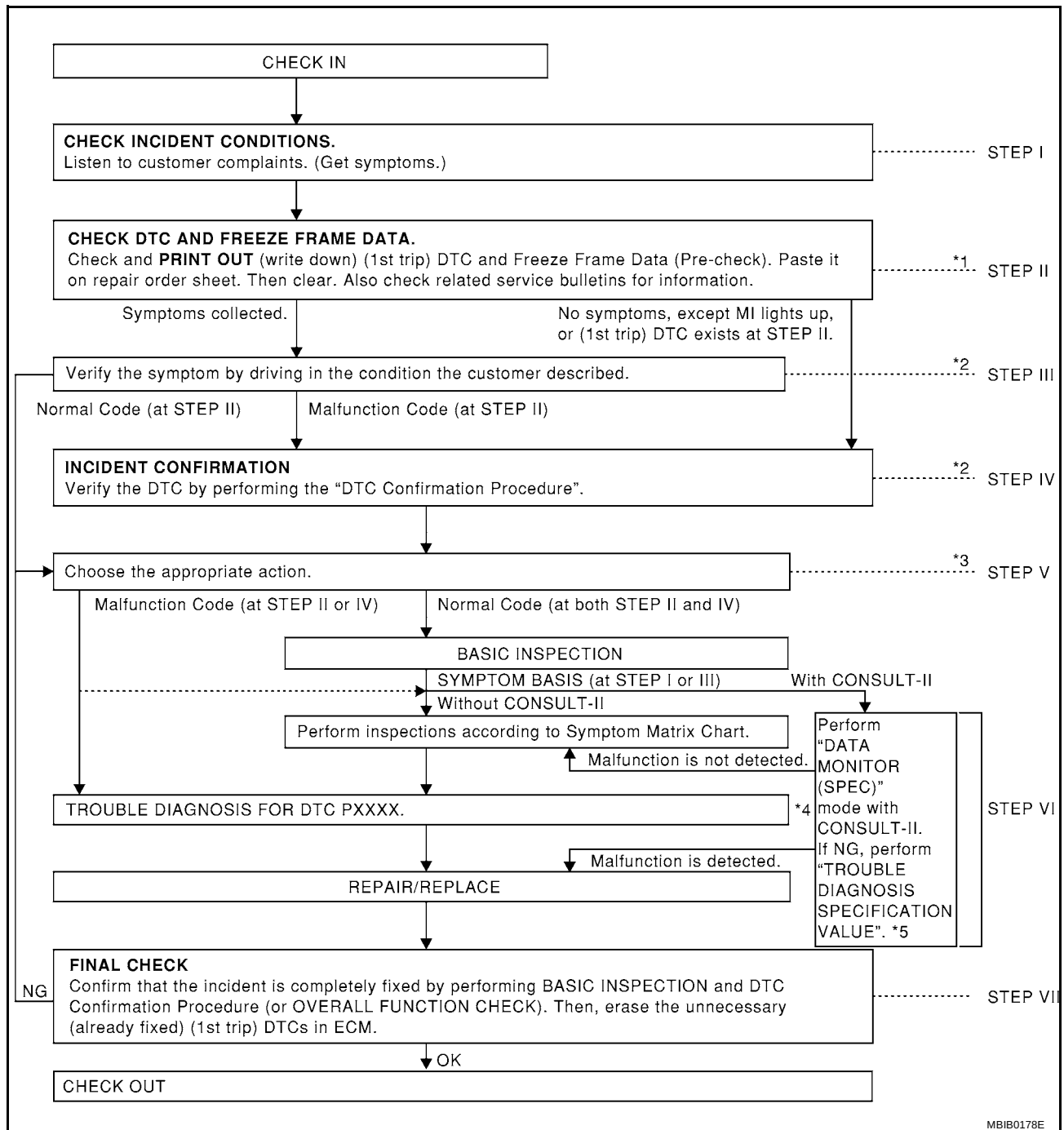
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on [EC-451](#) 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

Flow Chart



MBIB0178E

*1 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform [EC-499. "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*2 If the incident cannot be verified, perform [EC-499. "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to [EC-500. "POWER SUPPLY CIRCUIT FOR ECM"](#).

*4 If malfunctioning part cannot be detected, perform [EC-499. "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

*5 [EC-494. "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#)

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

Description for Work Flow

STEP	DESCRIPTION	
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-450 .	A
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-442 .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-458 .) Also check related service bulletins for information.	EC C
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.	D E
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.	F G
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-454 .) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS – SPECIFICATION VALUE". (Refer to EC-494 .) (If malfunction is detected, proceed to "PERAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-458 .)	H I
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-470 , EC-488 . The "Diagnostic Procedure" in EC section contains a description 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-24, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .	J K L
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)	M

DIAGNOSTIC WORKSHEET**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 or blink 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

[CR (WITHOUT EURO-OBD)]

A
EC
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MTBI 0017

EBS00OKJ

NOTE:

If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to **EC-505, "DTC U1000, U1001 CAN COMMUNICATION LINE"**.

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBd)]

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0107 P0108 Manifold absolute pressure sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0605 ECM ● P1171 Intake error ● P1229 Sensor power supply ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch
2	● P0132 P0134 Heated oxygen sensor 1 ● P0138 Heated oxygen sensor 2 ● P1065 ECM power supply ● P1122 Electric throttle control function ● P1124 P1126 Throttle control motor relay ● P1128 Throttle control mother ● P1805 Brake switch
3	● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

Fail-safe Chart

EBS000KK

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

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0107 P0108	Manifold absolute pressure sensor circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut.	
P0117 P0118	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-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II 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.	
P0221 P0222 P0223 P1223 P1224	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.	
P0226 P0227 P0228 P1227 P1228	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.	

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1121	Electric throttle control actuator (ECM detect 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, 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.
P1171	Intake air	When accelerator pedal is depressed, engine speed will not rise more than 2,500 rpm due to fuel cut.
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.

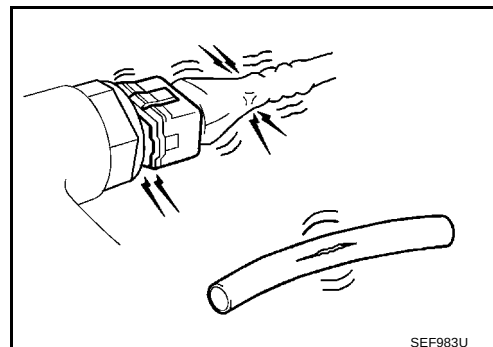
- When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up when there is a malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses is continuously detected as NG for 5 trips, ECM warns the driver that engine control system has a malfunction and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operate when above diagnoses except MI circuit 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

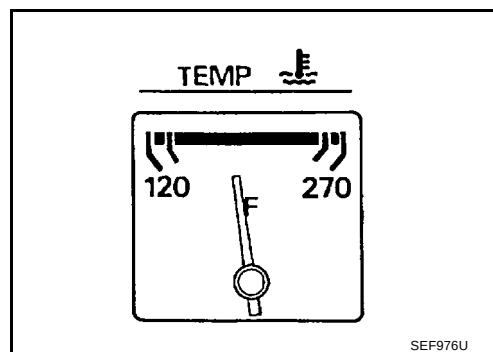
Basic Inspection

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.



SEF983U

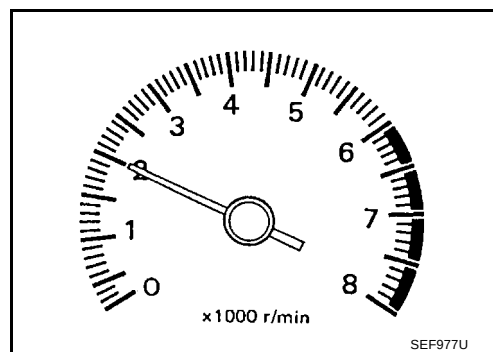


SEF976U

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-II.

OK or NG

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



SEF977U

2. REPAIR OR REPLACE

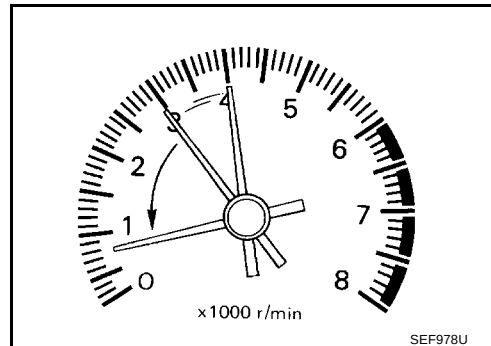
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".

>> GO TO 3

3. CHECK TARGET IDLE SPEED

With CONSULT-II

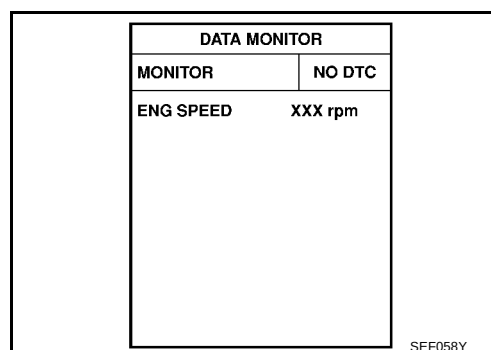
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. 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.
3. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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

1. Stop engine.
2. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-435, "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-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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-577](#) .
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-570](#) .

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 the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to [EC-443, "NATS \(Nissan Anti-theft System\)"](#) .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 5 ± 5° BTDC

A/T: 5 ± 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-435, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-435, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-435, "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-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

M/T: 650 ± 50 rpm

A/T: 700 ± 50 rpm (in "P" or "N" position)

 **Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 650 ± 50 rpm

A/T: 700 ± 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.

M/T: 5 ± 5° BTDC

A/T: 5 ± 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-46, "TIMING CHAIN"](#) .

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-577](#) .
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-570](#) .

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 the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to [EC-443, "NATS \(Nissan Anti-theft System\)"](#) .

>> GO TO 4.

Symptom Matrix Chart SYSTEM — BASIC ENGINE CONTROL SYSTEM

EBS000KM

		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-717
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4				EC-437
	Injector circuit	1	1	2	3	2		2	2			2			EC-711	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-731	

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBID)]

		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	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-735
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-454
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-591 , EC-593 , EC-599 , EC-604
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-454
	Ignition circuit	1	1	2	2	2		2	2			2			EC-683
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-500
Manifold absolute pressure sensor circuit		1	1	2	2	2		2	2			2			EC-508
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-513
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-536 , EC-542 , EC-628 , EC-634 , EC-636 , EC-647
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-548 , EC-557 , EC-638
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-518 , EC-524 , EC-671
Knock sensor circuit				2	2							3			EC-566
Crankshaft position sensor (POS) circuit		2	2												EC-570
Camshaft position sensor (PHASE) circuit		2	2												EC-577
Vehicle speed signal circuit			2	3		3						3			EC-699
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-584 , EC-587
Intake valve timing control solenoid valve circuit		3	3	2		1	3	2	2	3		3			EC-700
PNP switch circuit				3		3	3	3	3	3		3			EC-706
Refrigerant pressure sensor circuit			2				3	3	3	3		4			EC-722
Electrical load signal circuit							3	3	3	3					EC-727

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

	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	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-7 or MTC-14
ABS actuator and electric unit (control unit)			4											BRC-6

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		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 tank	5	5												FL-8
	Fuel piping			5	5	5		5	5			5			FL-3 , EM-28
	Vapor lock														—
	Valve deposit	5												—	
	Poor fuel (Heavy weight gaso-line, Low octane)			5	5	5		5	5			5			—

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

		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
Air	Air duct													
	Air cleaner													
	Air leakage from air duct (Manifold absolute pressure sensor —electric throttle control actuator)	5	5	5	5	5	5	5	5	5	5	5		EM-14
	Electric throttle control actuator													
	Air leakage from intake manifold/Collector/Gasket													EM-18
Cranking	Battery	1	1	1		1		1	1			1		1
	Alternator circuit													
	Starter circuit	3												
	Signal plate/Flywheel/Drive plate	6												
	PNP switch	4												
Engine	Cylinder head	5	5	5	5	5		5	5			5	3	
	Cylinder head gasket										4			
	Cylinder block												4	
	Piston													
	Piston ring	6	6	6	6	6		6	6			6		
	Connecting rod													
	Bearing													
	Crankshaft													
Valve mechanism	Timing chain													
	Camshaft													
	Intake valve timing control	5	5	5	5	5		5	5			5		
	Intake valve												3	
	Exhaust valve													
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5		
	Three way catalyst													

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

		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
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2	EM-22 , LU-6 , LU-7 , LU-3
	Oil level (Low)/Filthy oil													LU-4
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5	5	5	5	2	5			CO-10
	Thermostat													CO-22
	Water pump													CO-20
	Water gallery													CO-6
	Cooling fan													CO-10
	Coolant level (low)/Contaminated coolant													CO-7
NATS (Nissan Anti-theft System)		1	1											EC-443 or BL-201

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

Engine Control Component Parts Location

EBS000KN

A

EC

C

D

E

F

G

H

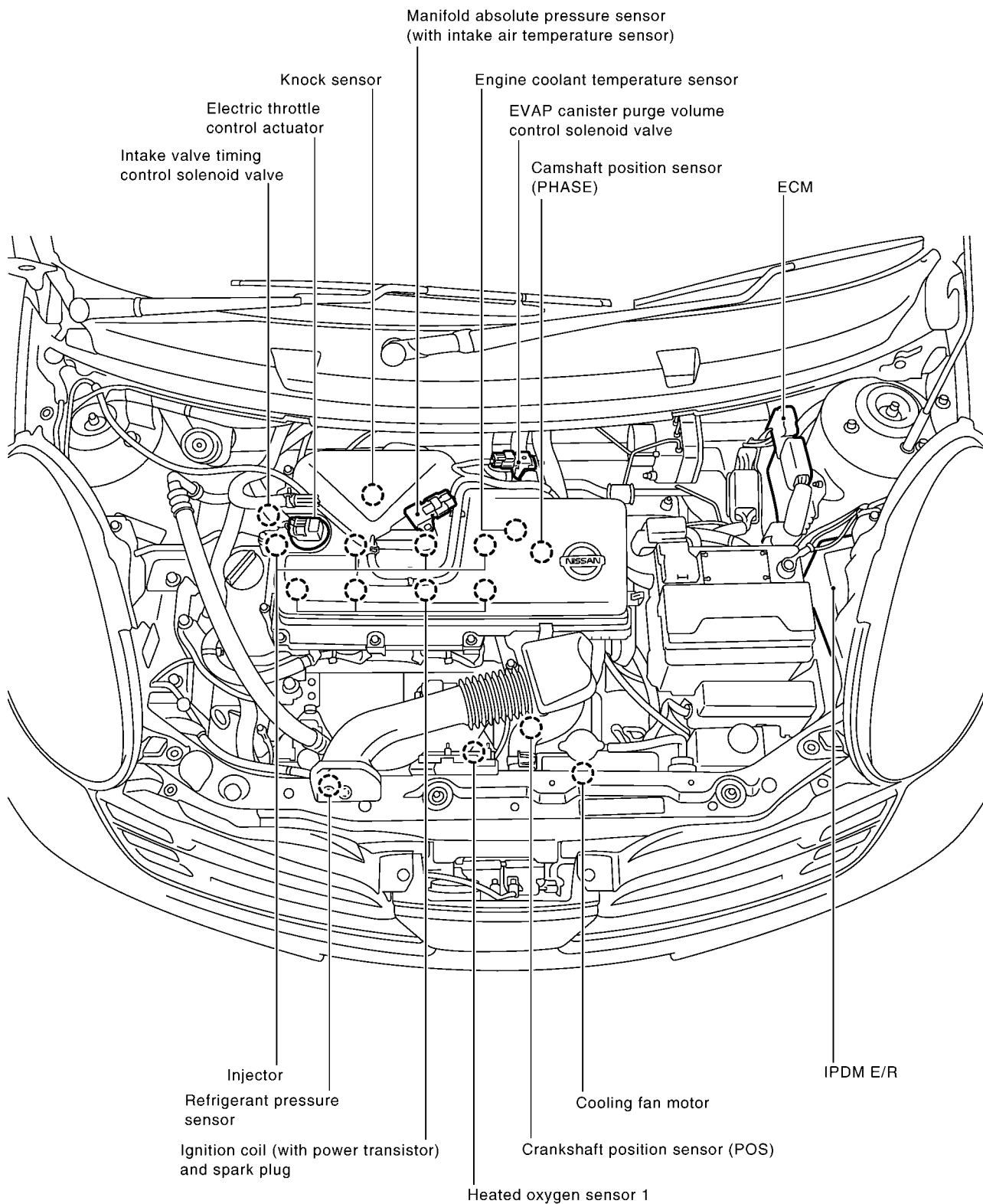
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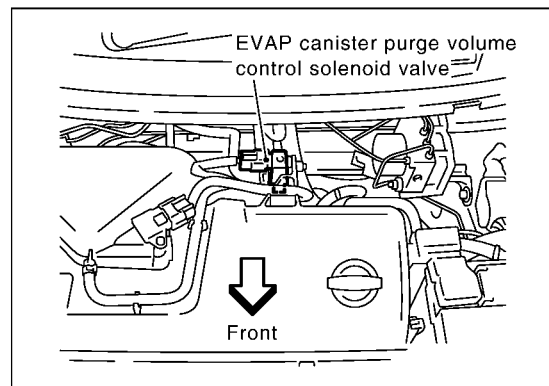
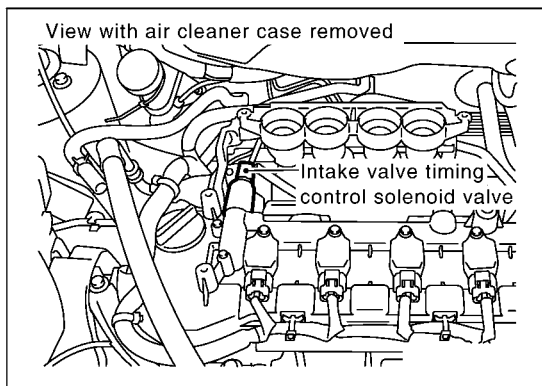
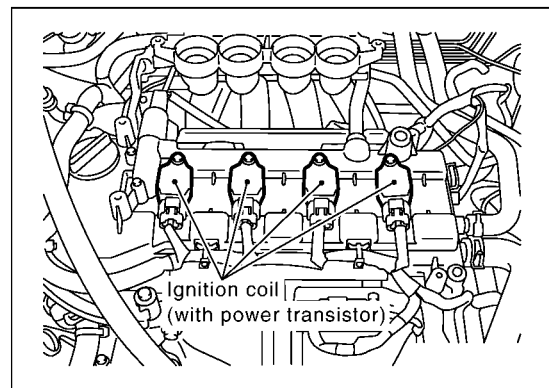
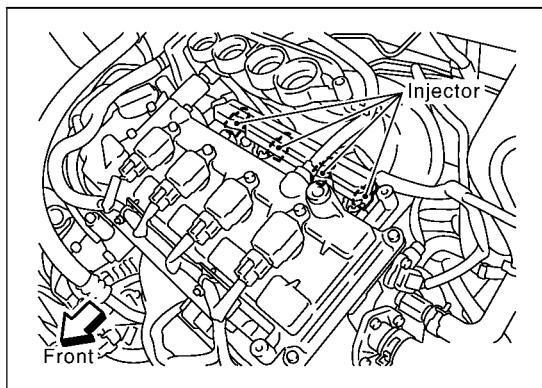
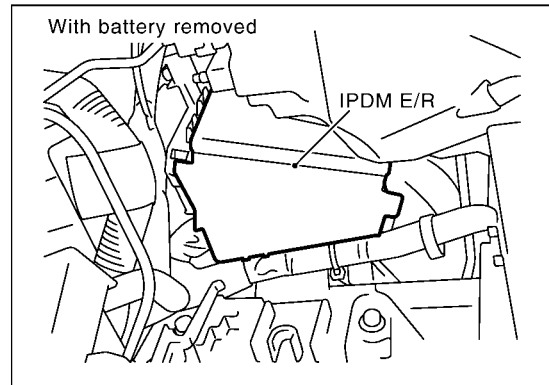
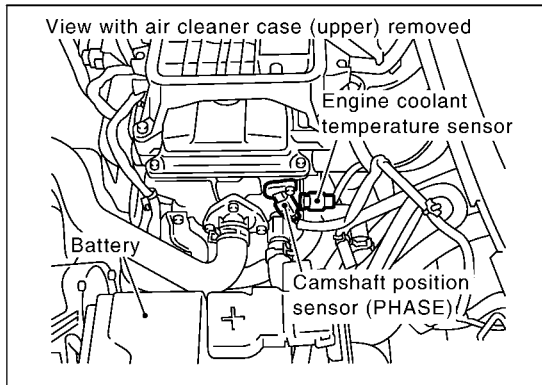
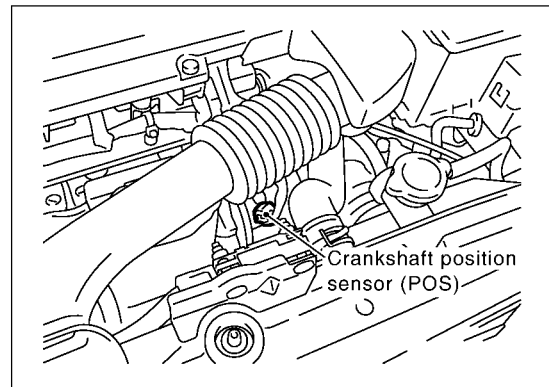
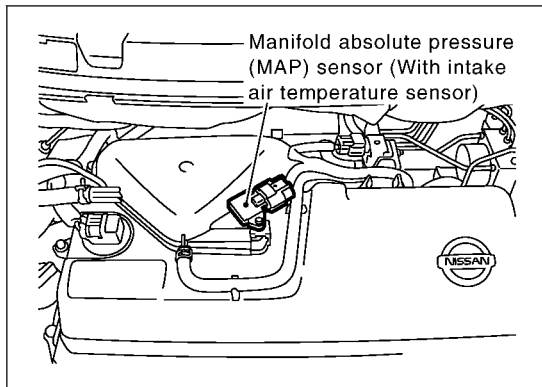
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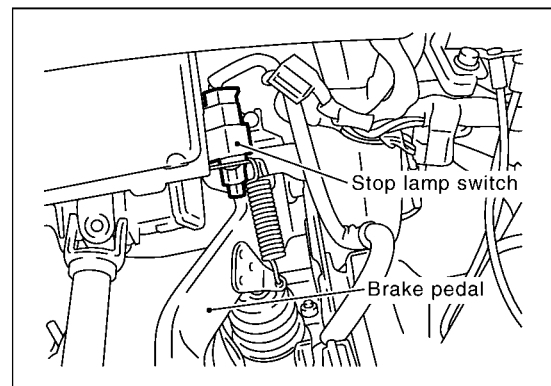
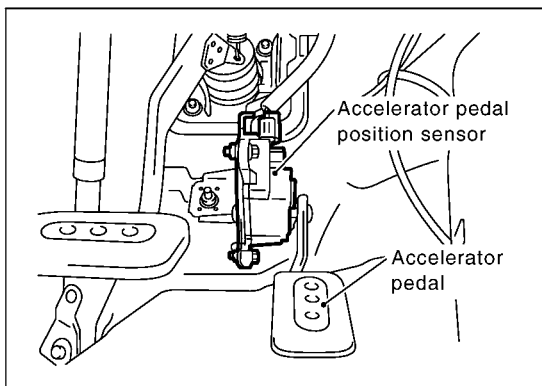
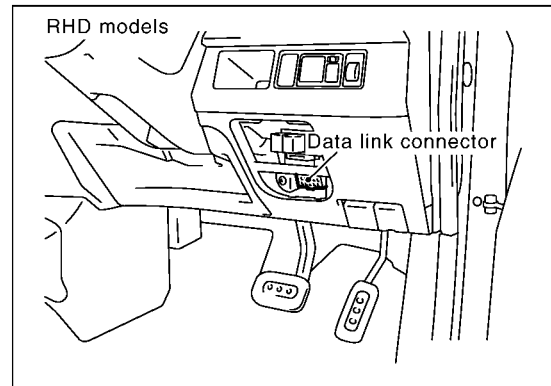
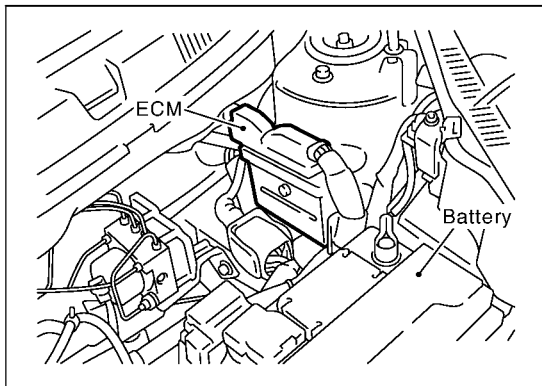
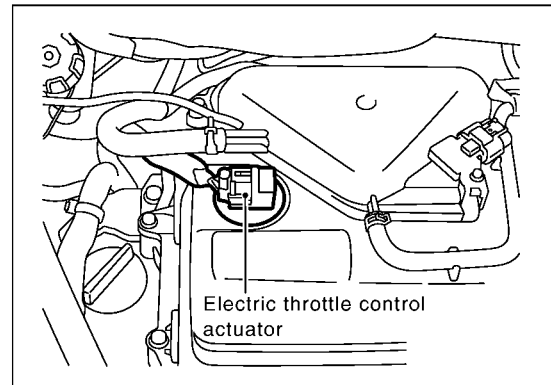
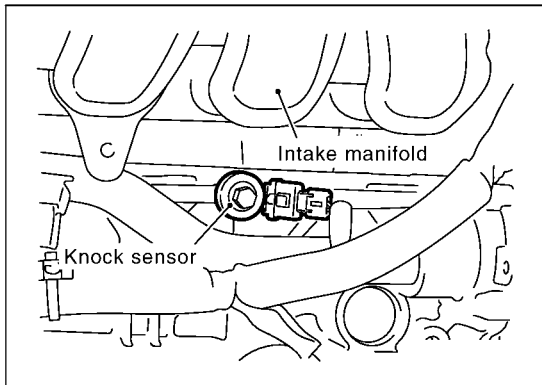
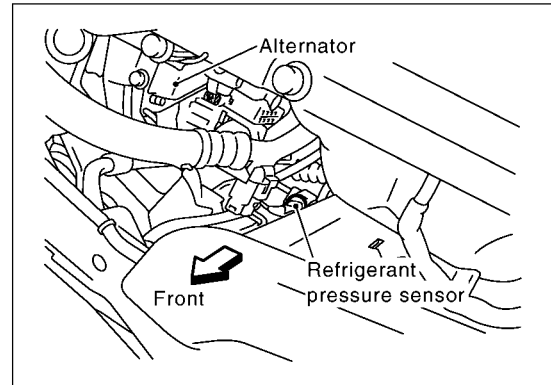
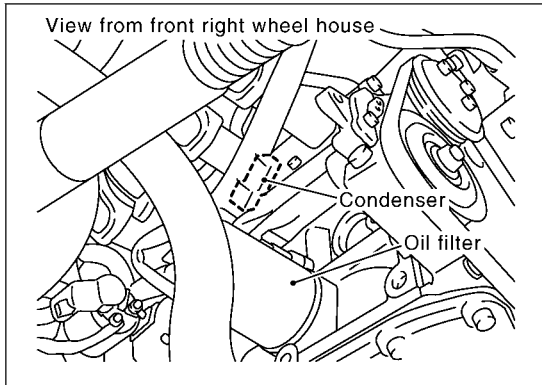
MB1B0267E

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]



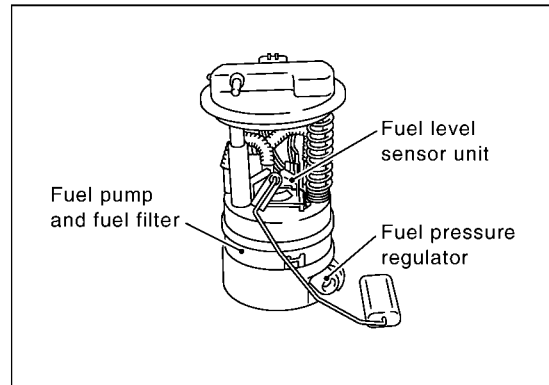
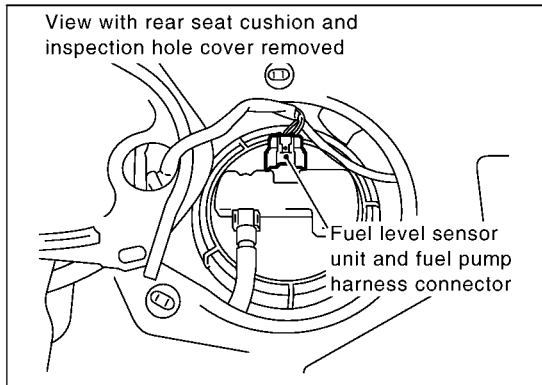
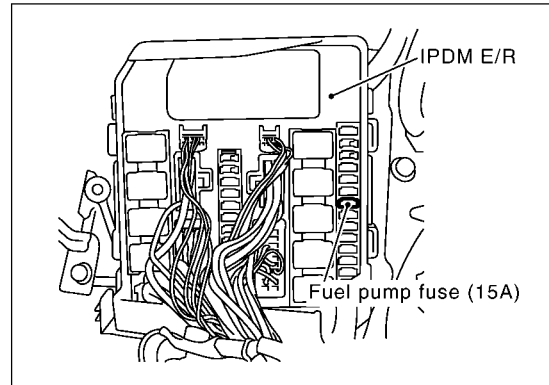
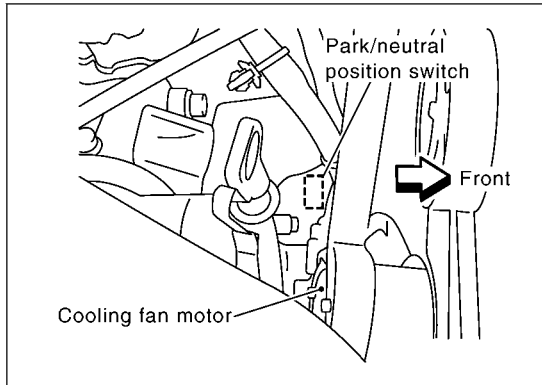
MBIB0316E



MBIB0317E

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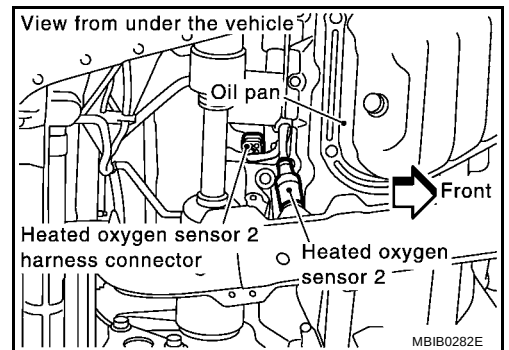
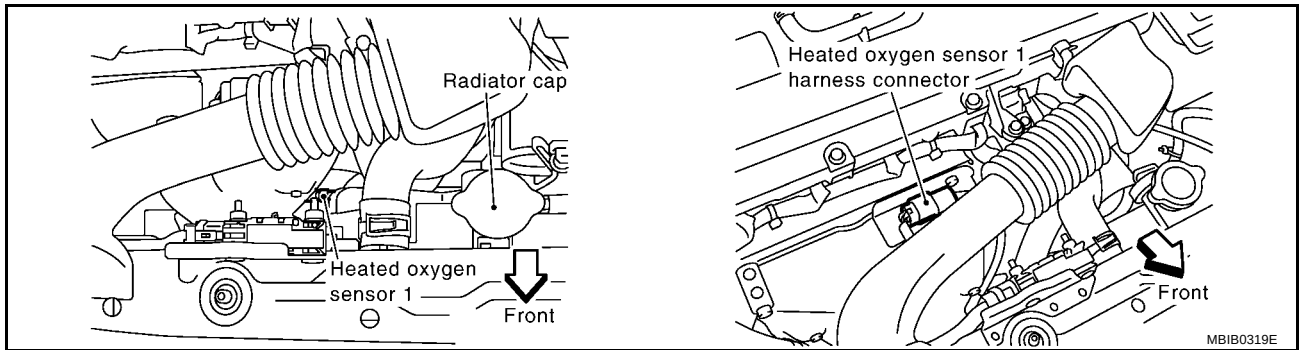
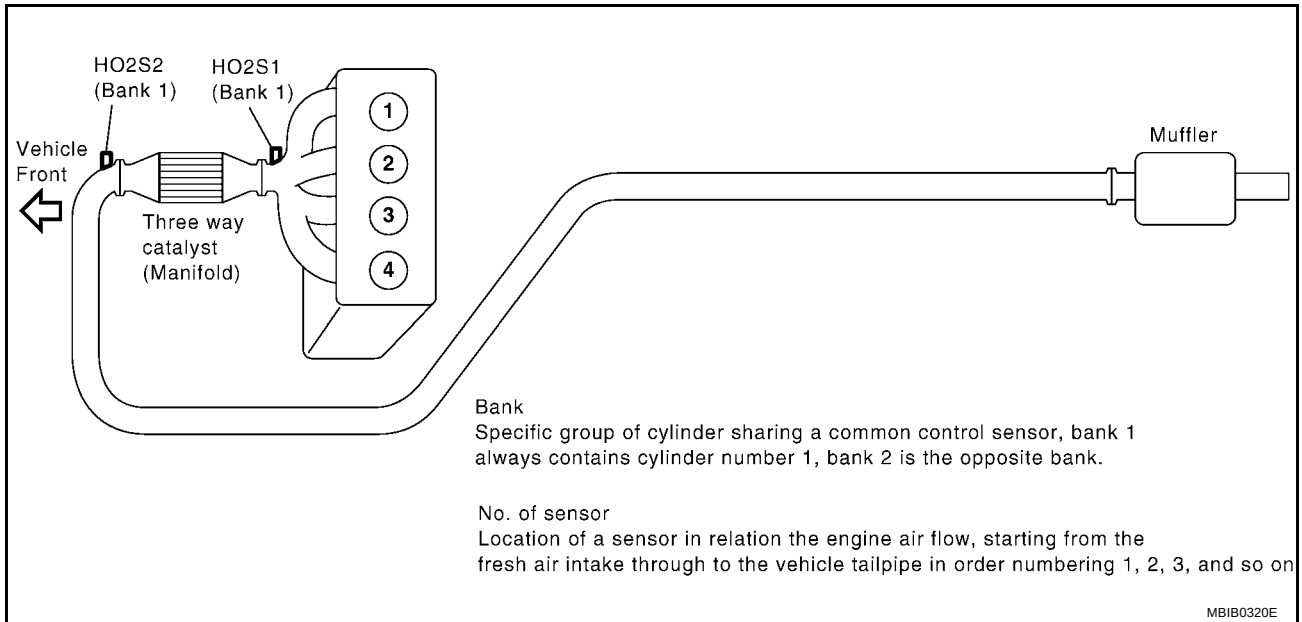
[CR (WITHOUT EURO-OBD)]



MBIB0318E

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[CR (WITHOUT EURO-OBD)]

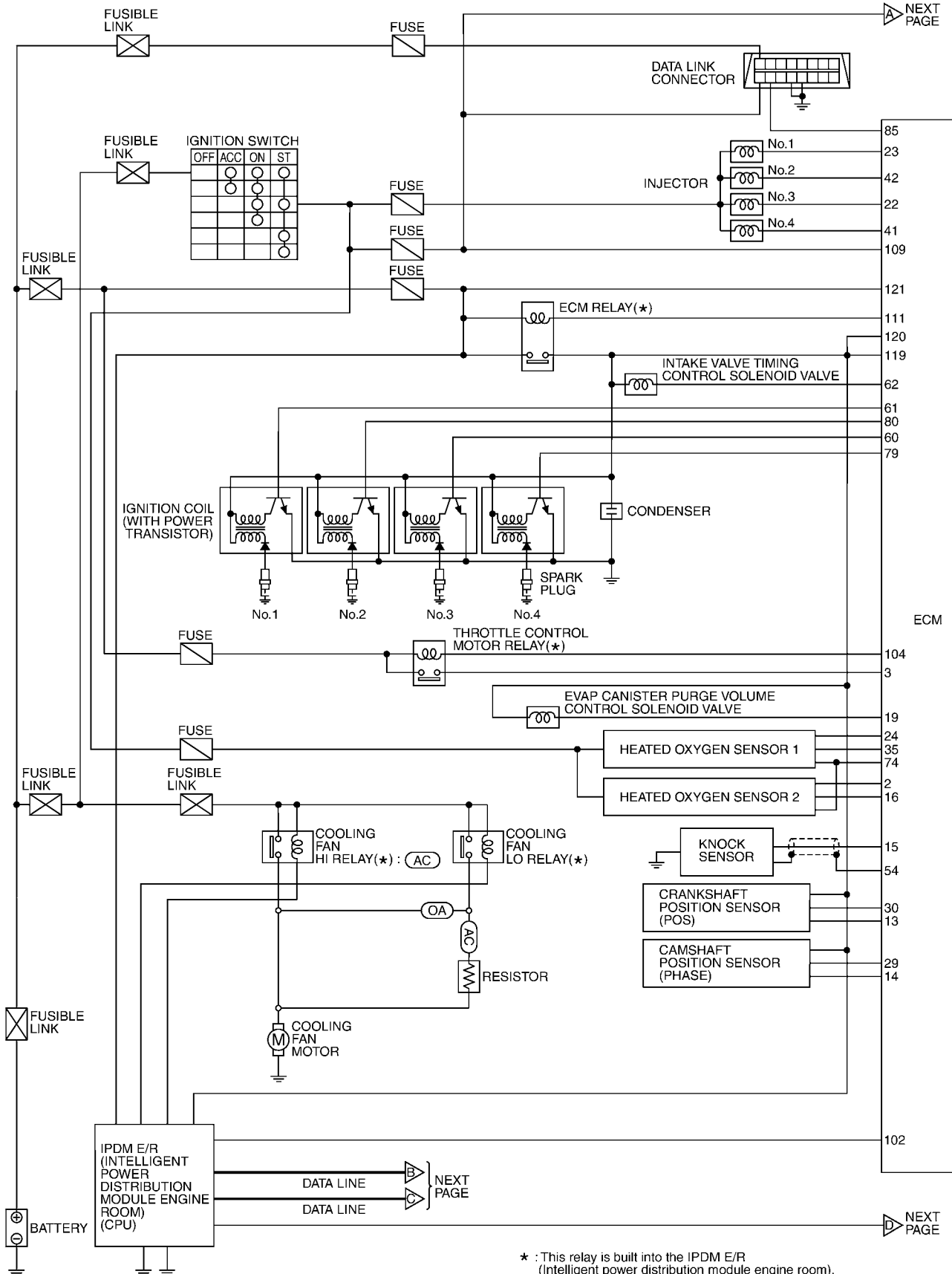


TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

Circuit Diagram

EBS000KO

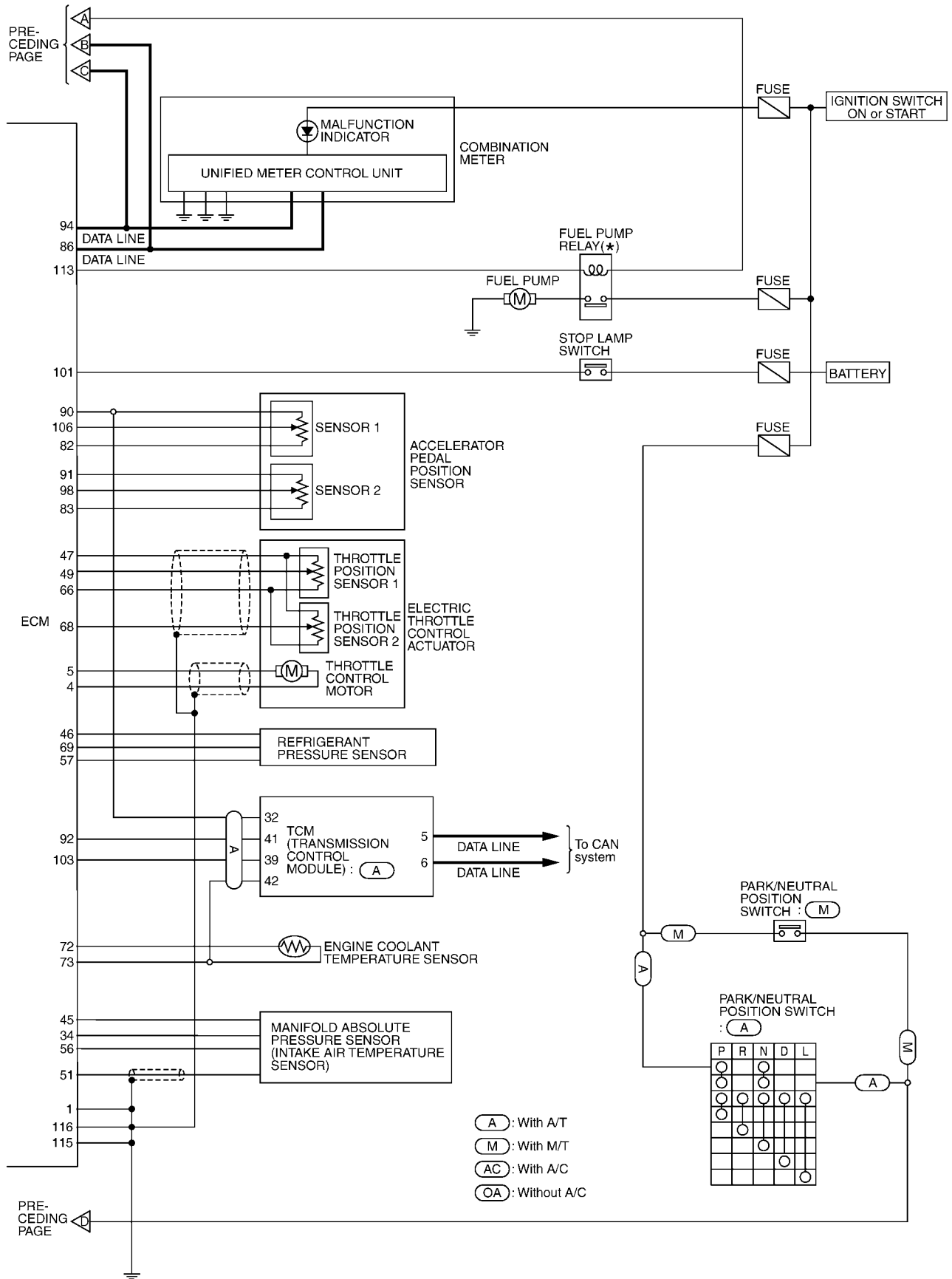


* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room).

MBWA0265E

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]



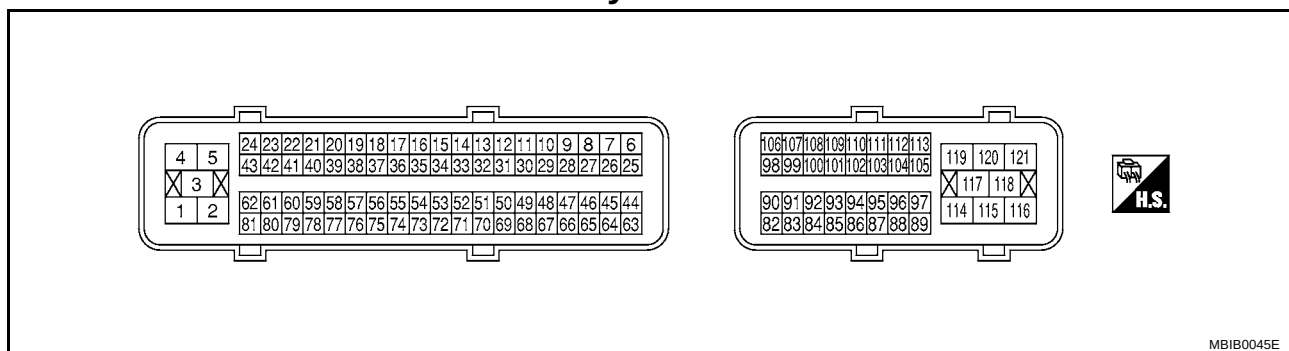
MBWA0266E

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

ECM Harness Connector Terminal Layout

EBS000KP

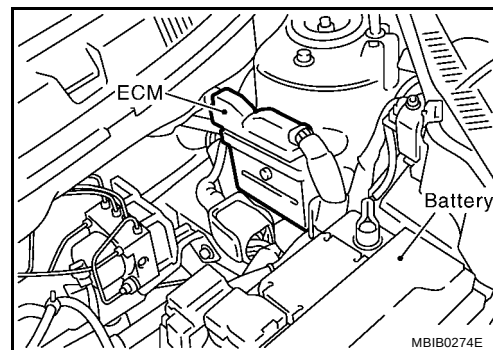


MBIB0045E

ECM Terminals and Reference Value PREPARATION

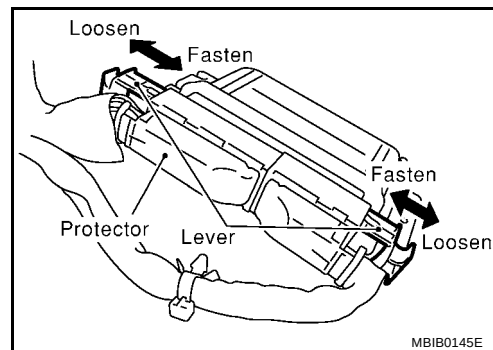
EBS000KQ

1. ECM is located left hand side of the engine room.
2. Remove ECM harness protector.



MBIB0274E

3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
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.



MBIB0145E

ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

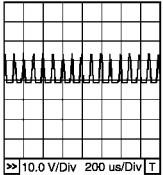
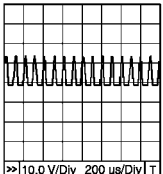
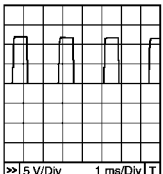
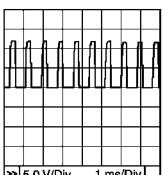
CAUTION:

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	[Engine is running] ● Idle speed	Engine ground

TROUBLE DIAGNOSIS

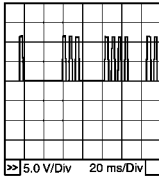
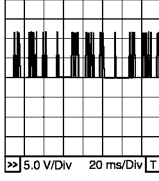
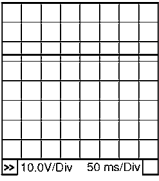
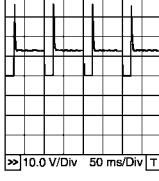
[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	GY	Heated oxygen sensor 2 heater	[Engine is running] - Engine speed is below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - 1.0V
			[Ignition switch "ON"] - Engine stopped [Engine is running] - Engine speed is above 3,800 rpm	BATTERY VOLTAGE (11 - 14V)
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
4	L	Throttle control motor (Close)	[Ignition switch "ON"] Engine stopped - Shift lever position is "D" (A/T model) - Shift lever position is "1st" (M/T model) - Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	P	Throttle control motor (Open)	[Ignition switch "ON"] Engine stopped - Shift lever position is "D" (A/T model) - Shift lever position is "1st" (M/T model) - Accelerator pedal is depressing	0 - 14V★  PBIB0533E
13	Y	Crankshaft position sensor (POS)	[Engine is running] Warm-up condition - Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

A
EC
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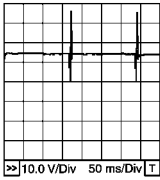
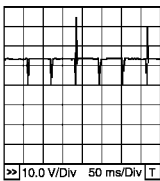
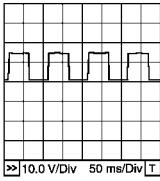
TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	[Engine is running] ● Warm-up condition ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Engine speed is Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	LG	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

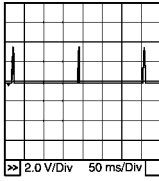
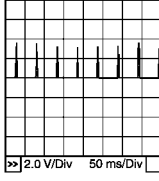
TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	OR L R GY	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	Y	Heated oxygen sensor 1 heater	[Engine is running] ● Warm-up condition ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
29	B	Sensors' ground (Camshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
30	B	Sensors' ground (Crankshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
34	OR	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	L	Sensor's power supply	[Ignition switch "ON"]	Approximately 5V
46	W	Sensor's power supply (Refrigerant pressure sensor)	[Ignition switch "ON"]	Approximately 5V
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V

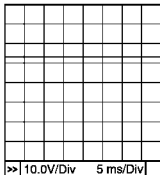
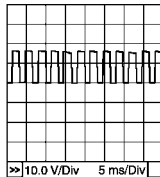
TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V
54	—	Sensors' ground (Knock sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
56	B	Sensors' ground (Manifold absolute pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
57	Y	Sensors' ground (Refrigerant pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
60 61 79 80	Y PU G BR	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] ● Warm-up condition ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

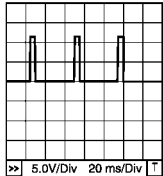
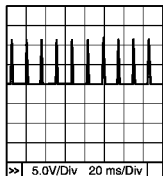
TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	LG	Intake valve timing control solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● Warm-up condition ● When revving engine up to 2,000 rpm quickly	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB00532E
66	B	Sensors' ground (Throttle position sen- sor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V
69	BR	Refrigerant pressure sensor	[Engine is running] ● Warm-up condition ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	P	Engine coolant tempera- ture sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensors' ground (Engine coolant temper- ature sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	LG	DATA link connector	[Ignition switch "ON"] ● CONSULT-II is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	W	CAN communication line	[Ignition switch "ON"]	1.0 - 2.5V
90	OR	Sensor's power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensor's power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
92	GY	Throttle position sensor signal output (A/T models)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Accelerator pedal fully released	Approximately 0.8V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Accelerator pedal fully depressed	Approximately 4.6V
94	R	CAN communication line	[Ignition switch "ON"]	2.5 - 4.0V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
101	W	Stop lamp switch	[Ignition switch "ON"] ● Brake pedal fully released	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
102	GY	PNP switch	[Ignition switch "ON"] ● Gear position is "P" or "N" (A/T models), "Neutral" (M/T models)	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
103	L/OR	Tachometer signal output (A/T models)	[Engine is running] ● Warm-up condition ● Idle speed	10 - 11V★  MBIB0053E
			[Engine is running] ● Engine speed is 2,000 rpm	10 - 11V★  MBIB0054E

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
104	G	Throttle control motor relay	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V
109	PU	Ignition switch	[Ignition switch "OFF"]	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
113	R	Fuel pump relay	[Ignition switch "ON"] ● For 1 seconds after turning ignition switch "ON"	0 - 1.0V
			[Engine is running] [Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	[Engine is running] ● Idle speed	Engine ground
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
121	BR	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.)

CONSULT-II Function FUNCTION

EBS000KR

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-II 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, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II 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.

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBDD)]

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE							
			WORK SUP- PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI- TOR	DATA MONI- TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP- PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×		×	×			
		Manifold absolute pressure sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed signal		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Intake air temperature sensor		×		×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Battery voltage				×	×			
		Electrical load signal				×	×			
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Intake valve timing control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

X: Applicable

*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to [EC-441](#) .

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TROUBLE DIAGNOSIS

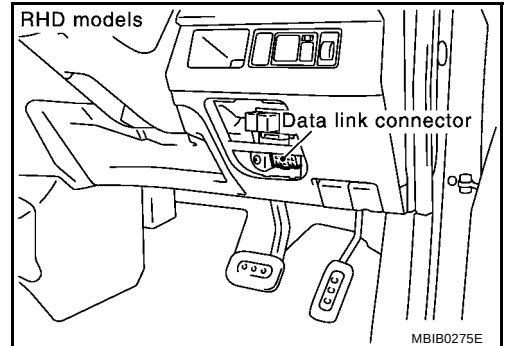
[CR (WITHOUT EURO-OBID)]

CONSULT-II INSPECTION PROCEDURE

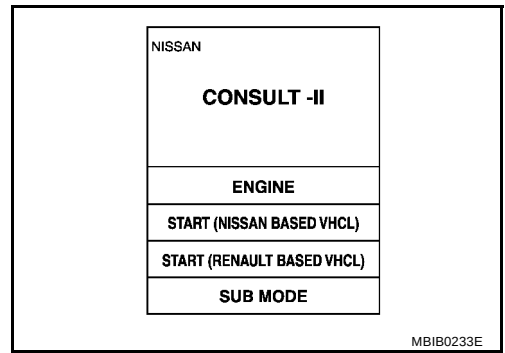
CAUTION:

If CONSULT-II is used with no connection to CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

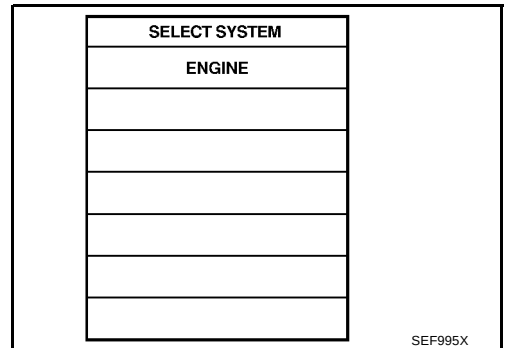
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" and "CONSULT-II CONVERTER" to data link connector, which is located under drivers side dash panel.
3. Turn ignition switch ON.



4. Touch "START(NISSAN BASED VHCL)".

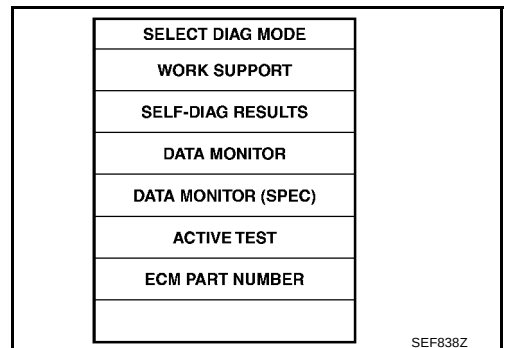


5. Touch "ENGINE".
If "ENGINE" is not indicated, go to [GI-36](#) , "CONSULT-II Data Link Connector (DLC) Circuit"



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

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 IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed

*: 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-413, "INDEX FOR DTC"](#).

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-413, "INDEX FOR DTC".)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed. - One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
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 TRIM-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.
S-FUEL TRIM-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.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VHCL 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.

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
ENG SPEED [rpm]	×	×		Indicates the engine speed computed from the signals 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.
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.
HO2S1 (B1) [V]	×	×		The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×			The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×	×		Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	- After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. - When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
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.
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.
VHCL SPEED SE [km/h] or [mph]	×	×		The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×		The power supply voltage of ECM is displayed.	
B/FUEL SCHDL [msec]		×		"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
ACCEL SEN 1 [V]	×	×		The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×				
THRTL SEN 1 [V]	×	×		The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×				

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
INT/A TEMP SE [°C] or [°F]	×	×		The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
TURBO BST SEN	×			The signal voltage of the manifold absolute pressure sensor is displayed.	
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 the 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) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×		[ON/OFF] condition of the power steering oil pressure switch as determined by the power steering oil pressure 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.	
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.
IGN TIMING [BTDC]		×		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 airflow divided by peak airflow.	
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.	

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TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	Description	Remarks
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. - ON ... intake valve timing control is operating. - OFF ... Intake valve timing control 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]				- Indicates the condition of the cooling fan (determined by ECM according to the input signals). - HI ... High speed operation - LOW ... Low speed operation - OFF ... Stop	
HO2S1 HTR (B1) [ON/OFF]				Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]				Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
VEHICLE SPEED [km/h] or [mph]	×			Indicates the vehicle speed computed from the secondary speed sensor 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 MI is activated.	
O2 SEN HTR DTY [%]				Indicates the heated oxygen sensor 1 heater control valve computed by the ECM according to the input signals.	
AC PRESS SEN [V]	×			The signal voltage from the refrigerant pressure sensor is displayed.	
CRUISE LAMP [ON/OFF]				Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBID)]

Monitored item [Unit]	ECM INPUT SIG- NALS	MAIN SIG- NALS	CAN DIAG SUP- PORT MNTR	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					
CAN COMM [OK/NG]			×	Indicates the communication condition of CAN communication line.	These items are not displayed in “SELECTION FROM MENU” mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		
CAN CIRC 8 [OK/UNKWN]			×		
CAN CIRC 9 [OK/UNKWN]			×		

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 signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×		Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
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 [%]		×	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.

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[CR (WITHOUT EURO-OBID)]

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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	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 "N" ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN*1	● Ignition switch: ON ● Turn the cooling fan "ON" and "OFF" with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
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-II.	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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

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

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

Description

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1. "AUTO TRIG" (Automatic trigger):

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[CR (WITHOUT EURO-OBID)]

- The malfunction will be identified on the CONSULT-II 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-II OPERATION MANUAL.

DATA MONITOR	
Recording Data...11%	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
VHCL SPEED SE	XXX km/h

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2. "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

SET RECORDING CONDITION	
AUTO TRIG	
MANU TRIG	
TRIGGER POINT	
0% 20% 40% 60% 80% 100%	
RECORDING SPEED	
MIN	MAX
/64 /32 /16 /8 /4 /2 FULL	

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Operation

1. "AUTO TRIG"

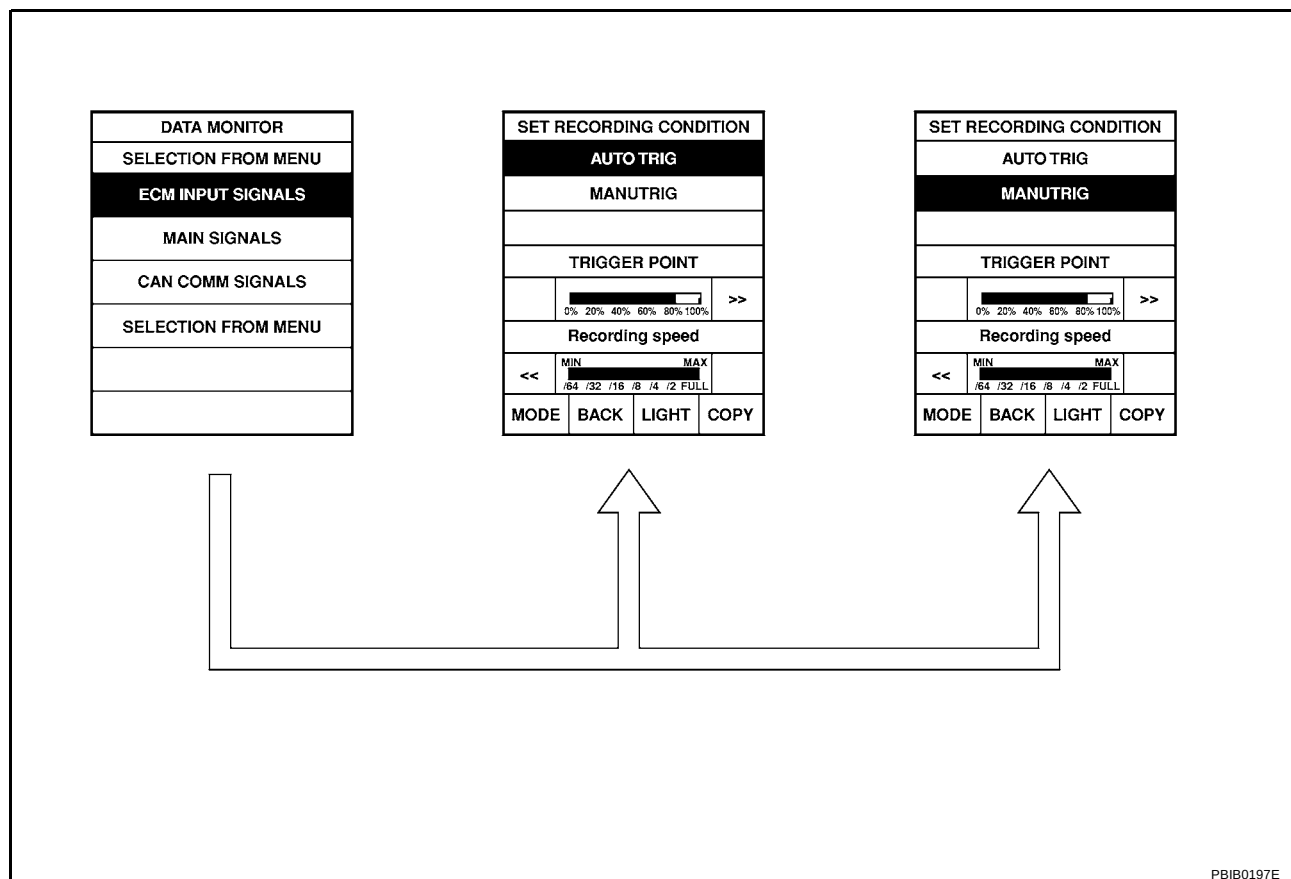
- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO 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-24, "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-II 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.

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CONSULT-II Reference Value in Data Monitor Mode

EBS000KT

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	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54% - 155%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

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MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 MNTR (B1)	- Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	Revving engine from idle to 3,000 rpm quickly.	LEAN ↔ RICH
VEH SPEED SE	Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*2	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRTL SEN1 THRTL SEN2*1	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
TURBO BST SEN	- Engine: After warming up - Air conditioner switch: OFF - Shift lever: N - No-load	At idle	Approximately 1.5V
		At 2,500 rpm	Approximately 1.2V
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 is in neutral position. (Forward direction)	OFF
		Steering wheel is 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 is OFF 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 is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	- Engine: After warming up - Shift lever: 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

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MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0° - 10° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	-5° - 5°C
		When revving up to 2,000 rpm quickly	Approx. 0° - 20°C
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving up to 2,000 rpm quickly	Approx. 0% - 50%
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 seconds 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 is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (210°F)	LOW*2
		Engine coolant temperature is 105°C (212°F) or more	HIGH*2
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF

TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 HTR (B1)	- Engine speed is below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		ON
	Engine speed: Above 3,800 rpm		OFF
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 mile)
O2SEN HTR DTY	- Engine coolant temperature when engine started: More than 80°C (176°F) - Engine speed: below 3,600 rpm		Approx. 50%
AC PRESS SEN	Ignition switch: ON (Engine stopped)		Approx. 0V
	Engine: Idle		1.0 - 4.0V
	Air conditioner switch: OFF		
CAN COMM	Ignition switch: ON		OK
CAN CIRC 1			OK
CAN CIRC 2			OK or UNKWN
CAN CIRC 3			OK
CAN CIRC 4			OK
CAN CIRC 5			UNKWN
CAN CIRC 6			OK
CAN CIRC 7			OK
CAN CIRC 8			UNKWN
CAN CIRC 9			OK or UNKWN

*1 : 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.

*2 : Models without air conditioner, cooling fan operates only ON and OFF operation, but CONSULT-II display will change OFF, LOW and HI depends on engine coolant temperature.

Major Sensor Reference Graph in Data Monitor Mode

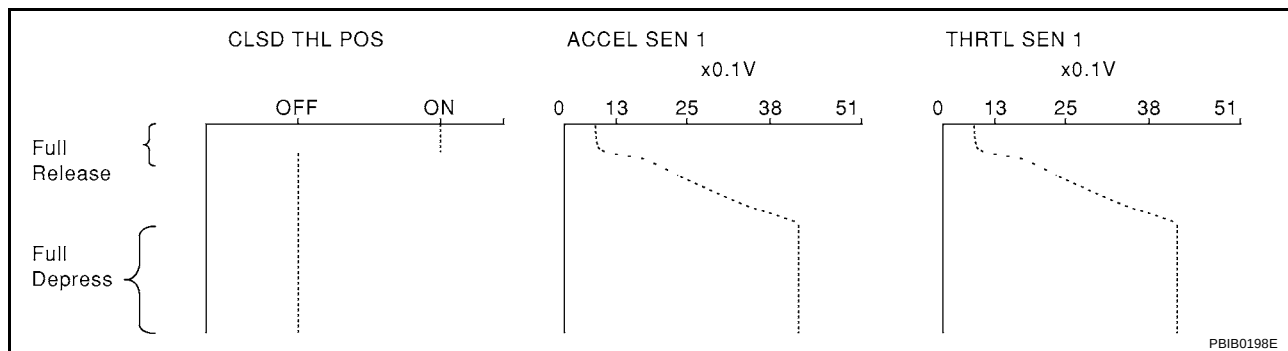
EBS000KU

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 models) or with shift lever in "1st" position (M/T models).

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".



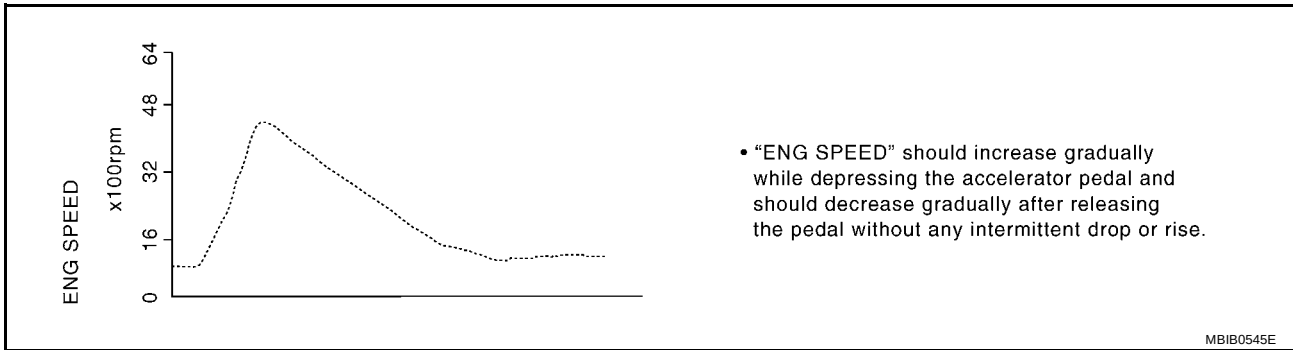
ENG SPEED, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for "ENG SPEED", "THRTL SEN 1", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

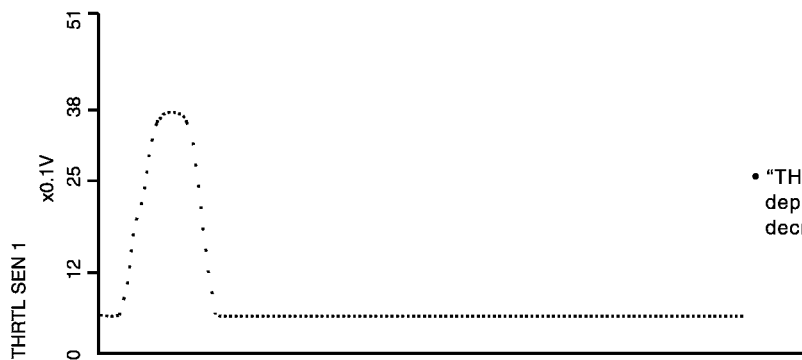
TROUBLE DIAGNOSIS

[CR (WITHOUT EURO-OBD)]

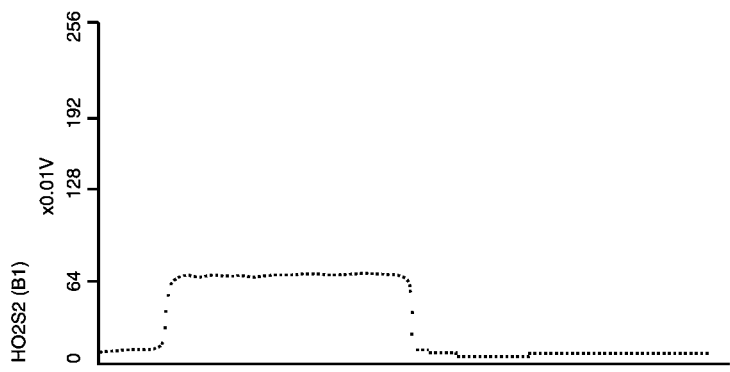
Each value is for reference, the exact value may vary.



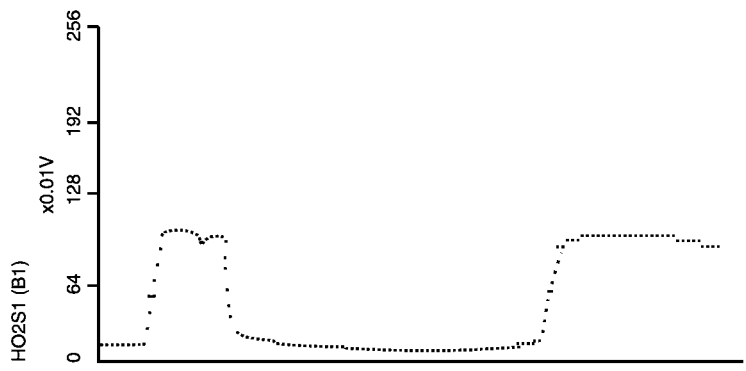
A
EC
C
D
E
F
G
H
I
J
K
L
M



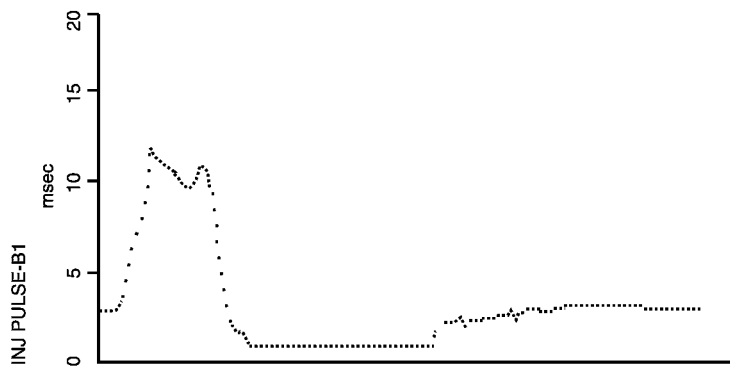
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

EBS000KV

The specification (SP) value indicates the tolerance of the value that is displayed in "DATA MONITOR (SPEC)" mode of CONSULT-II 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 MI.

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 (The mean value of air-fuel ratio feedback correction factor per cycle)

Testing Condition

EBS000KW

- Vehicle driven distance: More than 5,000 km (3,017 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)
- Transmission: Warmed-up*¹
- Electrical load: Not applied*²
- Engine speed: Idle

*1: For 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).

For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.

*2: Rear window defogger switch, air conditioner switch, lighting switch are "OFF". Steering wheel is straight ahead.

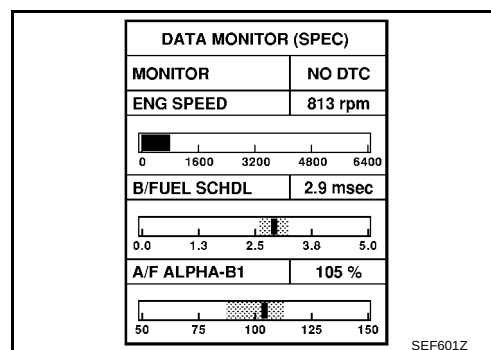
Inspection Procedure

EBS000KX

NOTE:

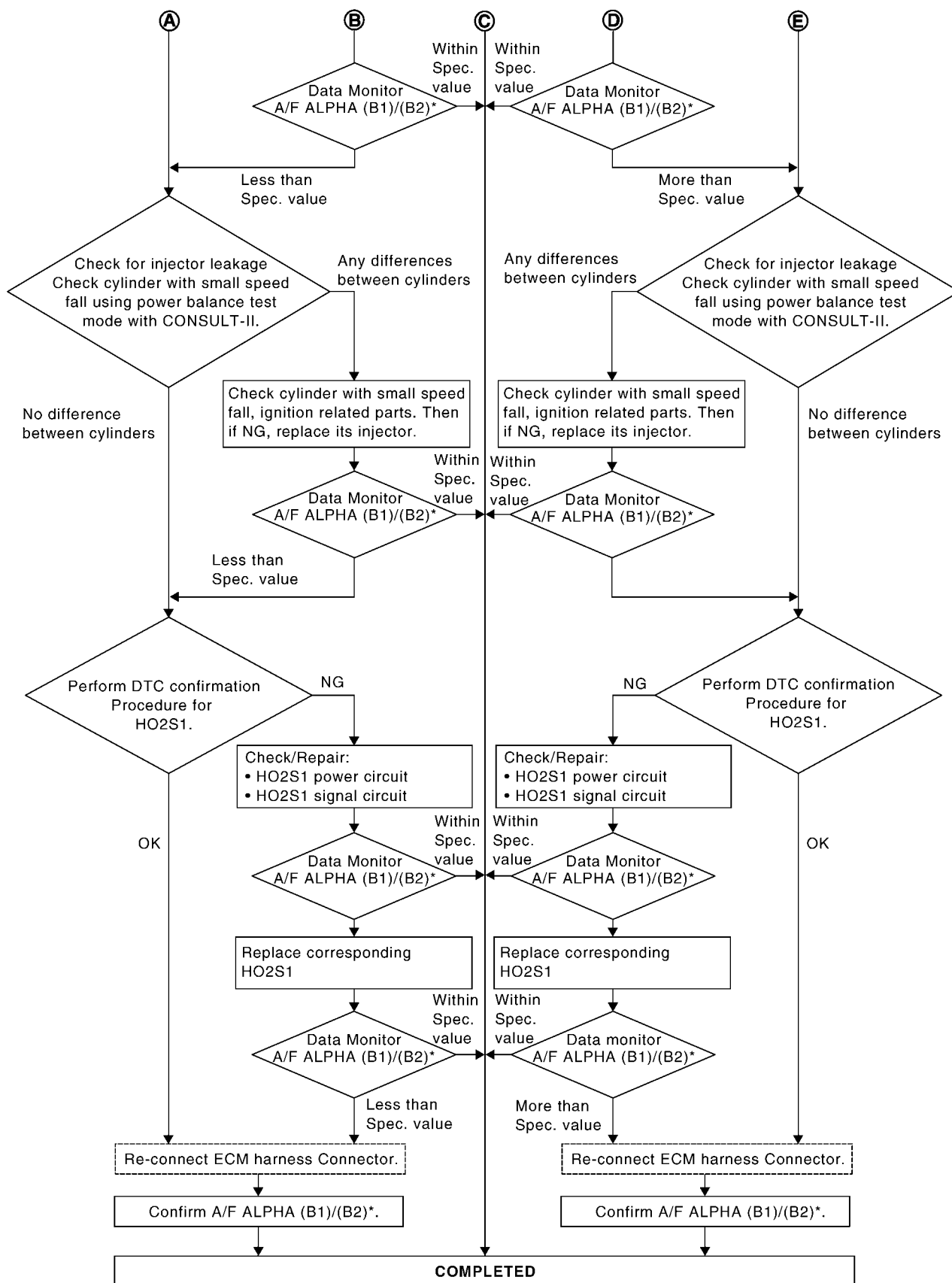
Perform "DATA MONITOR (SPEC)" mode in maximum scale display.

1. Perform [EC-454, "Basic Inspection"](#).
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL" and "A/F ALPHA-B1" in "DATA MONITOR (SPEC)" mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-495, "Diagnostic Procedure"](#).



TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[CR (WITHOUT EURO-OBD)]

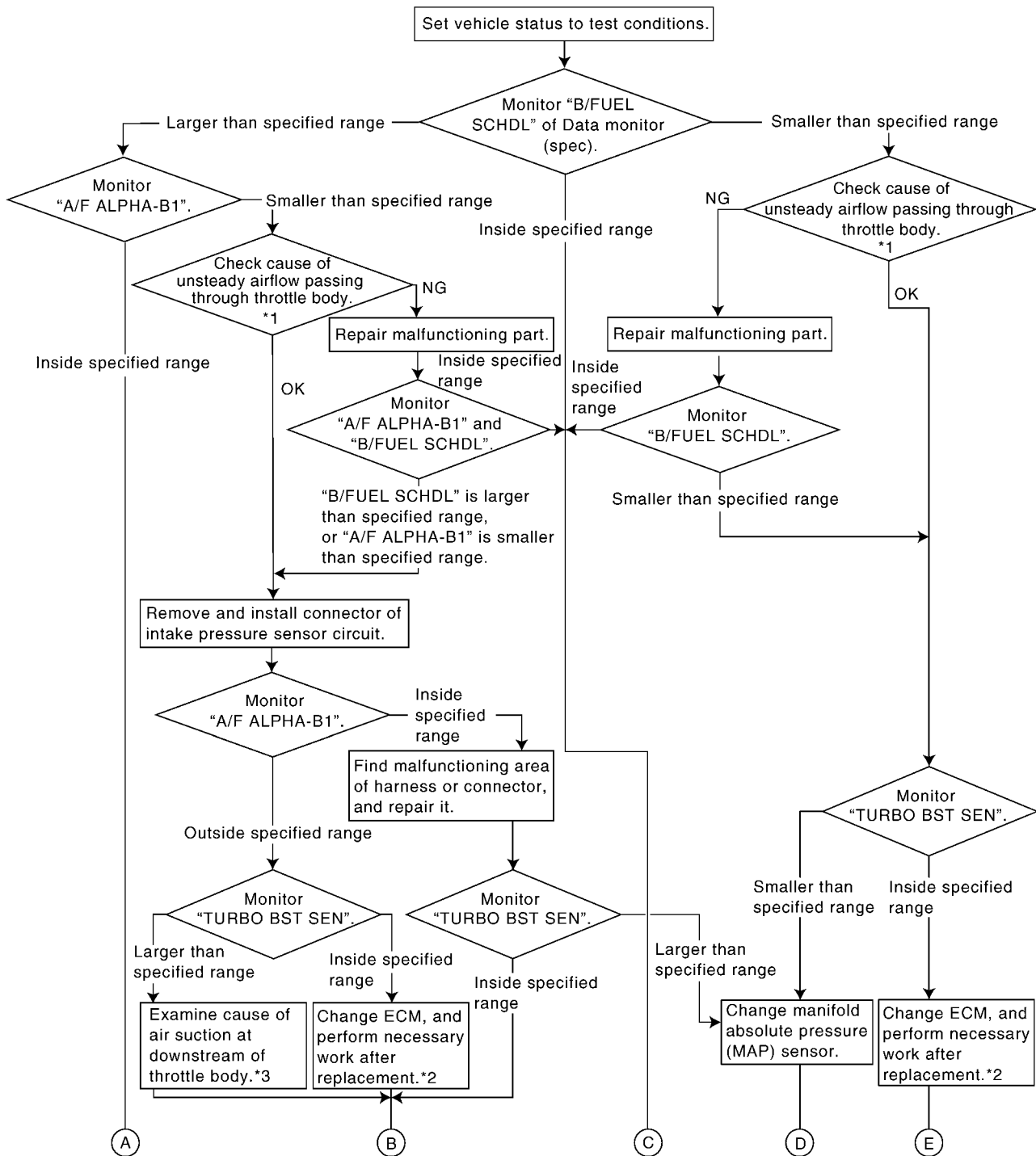


SEF768Z

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[CR (WITHOUT EURO-OBID)]

CHECK B/FUEL SCHDL



*1

Inspection Location

- Crushed air duct
- Improper sealing of air cleaner element
- Unevenly dirty air cleaner element
- Different specification of intake air system part

etc.

*2

Refer to ECM Removal and Installation procedure in Service Manual.

*3

Inspection Location

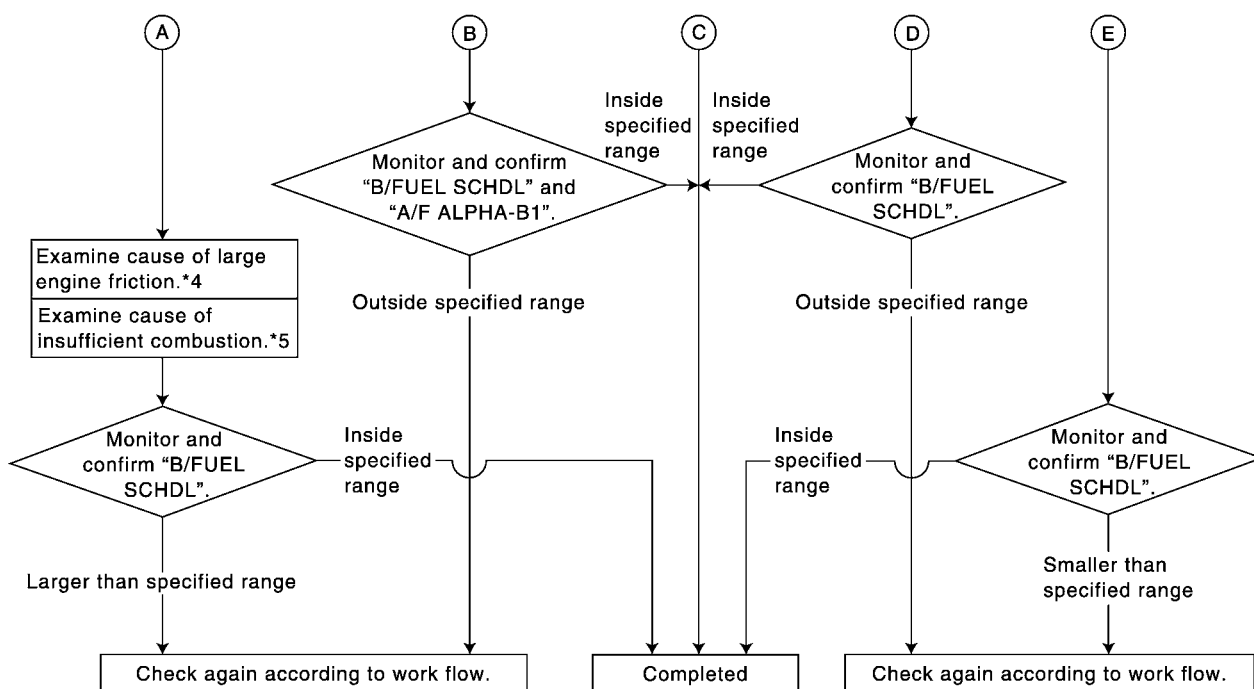
- Disconnection, looseness, or cracks of air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open sticking, breakage, hose disconnection, or cracks of blow-by gas control valve
- Disconnection or cracks of EVAP canister purge hose, open sticking of EVAP canister purge volume control valve
- Improper sealing of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts.
- Improper sealing of intake air system part gasket

etc.

PBIA1516E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[CR (WITHOUT EURO-OBD)]



*4

Inspection Location

- Overhigh engine oil level
- Engine oil viscosity
- Over-tensioned belt of power steering, alternator, and air conditioner compressor, unusual noise, or binding of pulley
- Unusual noise of engine
- Unusual noise of gear change
- etc.

*5

Inspection Location

- EGR valve sticking
- Improper valve clearance
- Malfunction of intake valve timing control function
- Improper installation of camshaft sprocket
- etc.

MBIB0658E

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

[CR (WITHOUT EURO-OBDD)]

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS000KZ

Intermittent incidents (I/I) 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 I/I 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 I/I Report Situations

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

Diagnostic Procedure

EBS000LO

1. INSPECTION START

Erase (1st trip) DTCs. Refer to [EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "Incident Simulation Tests", "Ground Inspection".

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "Incident Simulation Tests".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace.

[CR (WITHOUT EURO-OBD)]

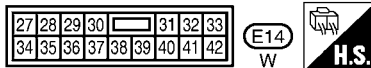
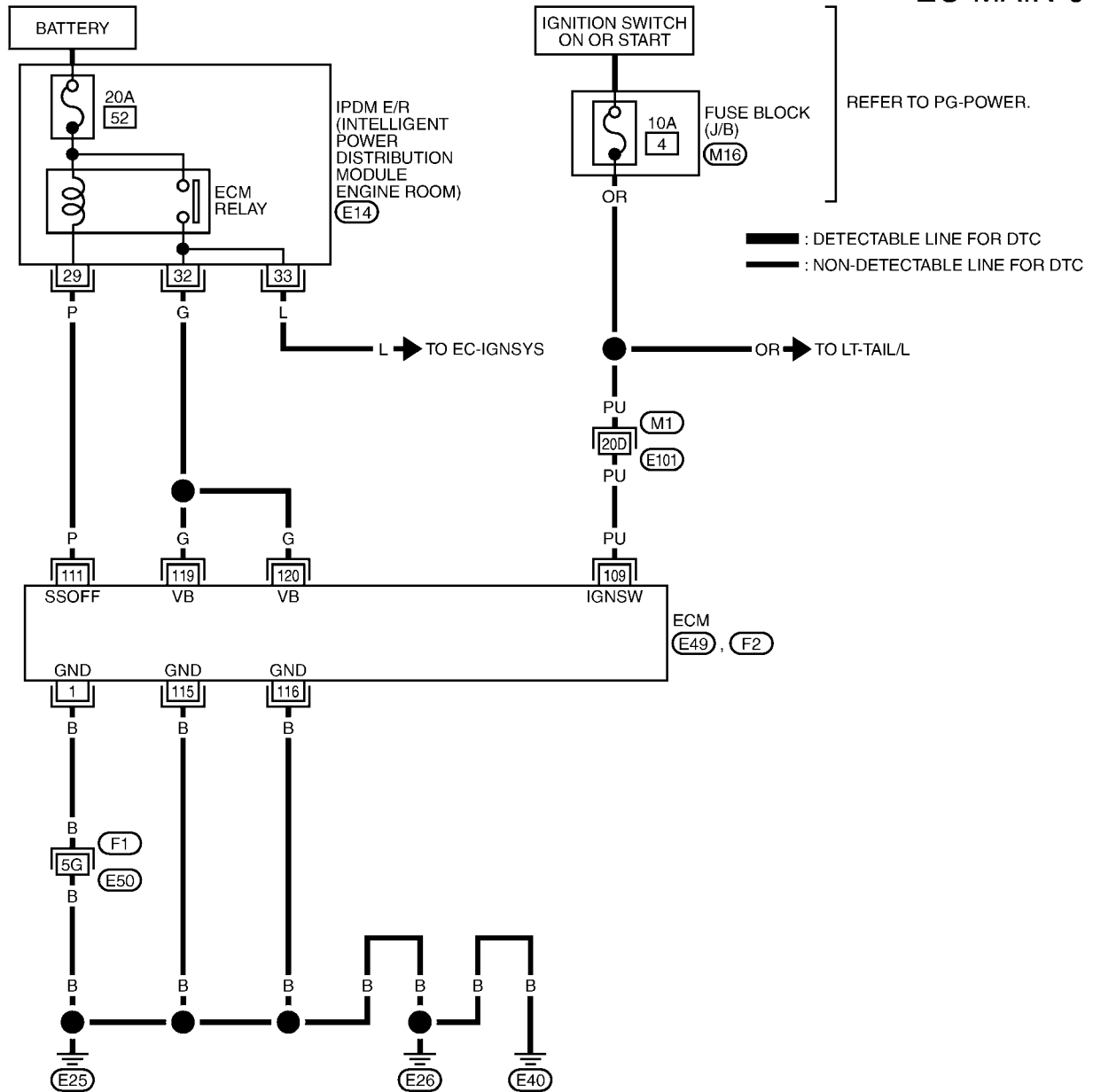
POWER SUPPLY CIRCUIT FOR ECM

PFP:24110

Wiring Diagram

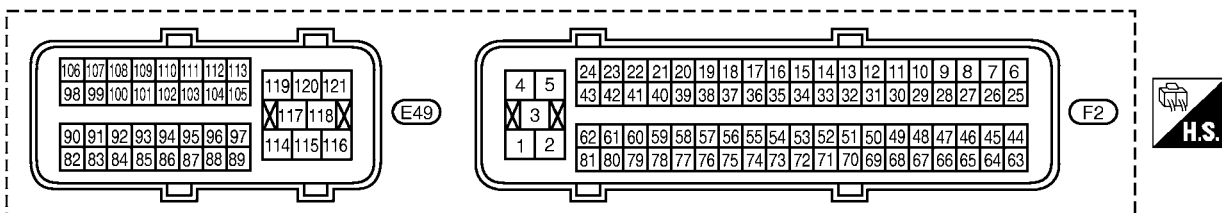
EBS00OL1

EC-MAIN-01



REFER TO THE FOLLOWING.

(M1) , (F1) -SUPER
MULTIPLE JUNCTION (SMJ)
(M16) -FUSE BLOCK-
JUNCTION BOX (J/B)



MBWA0267E

POWER SUPPLY CIRCUIT FOR ECM

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1 115 116	B B B	ECM ground	[Engine is running] ● Idle speed	Engine ground
109	PU	Ignition switch	[Ignition switch "OFF"]	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000L2

1. INSPECTION START

Start engine.

Is engine running?

Yes or No

- Yes >> GO TO 8.
No >> GO TO 2.

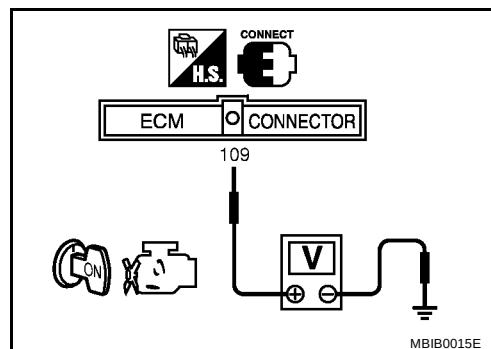
2. CHECK ECM POWER SUPPLY CIRCUIT-I

- Turn ignition switch "OFF" and then "ON".
- Check voltage between ECM terminal 109 and ground with CONSULT-II 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 M1, E101
- Fuse block (J/B) connector M16
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

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

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

4. 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 F1, E50
- Harness for open or short between ECM and engine ground

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

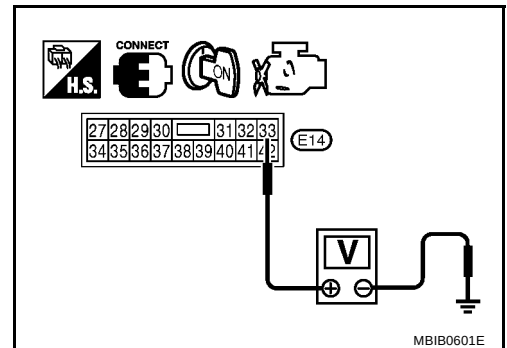
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Check voltage between IPDE E/R harness connector E14 terminal 33 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> Go to [EC-683, "IGNITION SIGNAL"](#).
NG >> GO TO 7.



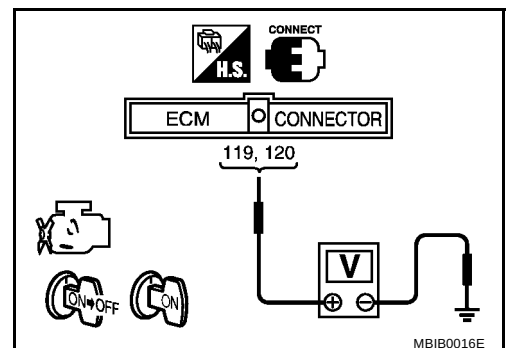
7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II 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 8.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.



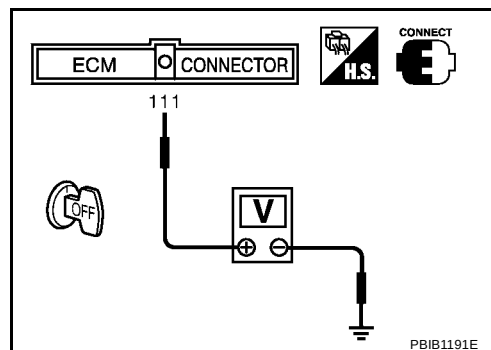
8. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch "OFF".
2. Check voltage between ECM terminal 111 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 10.

**9. CHECK ECM POWER SUPPLY CIRCUIT-V**

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 32. 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.

10. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 29. 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 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK 20A FUSE

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

OK or NG

- OK >> GO TO 13.
NG >> Replace 20A fuse.

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

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 13.

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

13. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

OK >> Replace IPDM E/R.

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

DTC U1000, U1001 CAN COMMUNICATION LINE

[CR (WITHOUT EURO-OBD)]

DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

EBS000L3

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

EBS000L4

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM cannot communicate to other control units.	● Harness or connectors (CAN communication line is open or shorted.)
U1001*2 1001*2		● ECM cannot communicate for more than the specified time.	

*1:These self-diagnosis have the one trip detection logic.

*2:The MI will not light up for this self-diagnosis.

DTC Confirmation Procedure

EBS000L5

1. Turn ignition switch "ON" and wait at least 3 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If 1st trip DTC or DTC is detected, go to [EC-507, "Diagnostic Procedure"](#) .

DTC U1000, U1001 CAN COMMUNICATION LINE

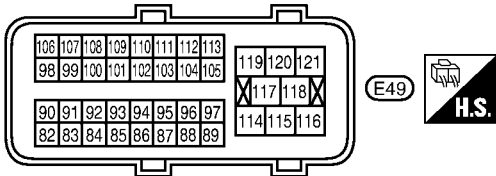
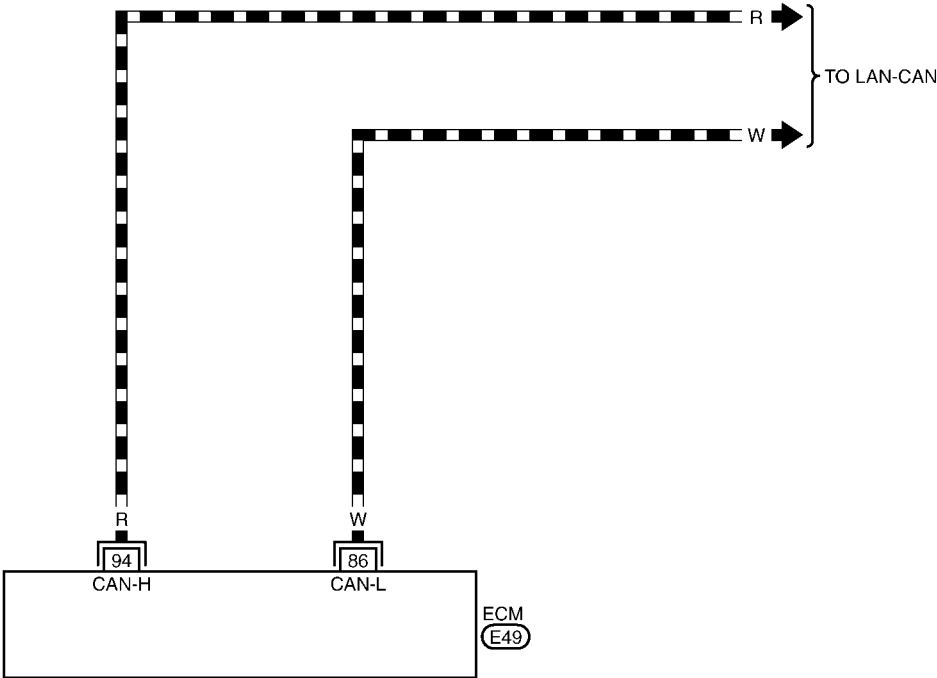
[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000L6

EC-CAN-01

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



DTC U1000, U1001 CAN COMMUNICATION LINE [CR (WITHOUT EURO-OBDD)]

EBS000L7

Diagnostic Procedure

1. INSPECTION START

1. Turn ignition switch "ON".
2. Select "CAN DIAG SUPPORT MNTR" in "DATA MONITOR" mode with CONSULT-II.
3. Print out the CONSULT-II screen.

A/T Models with EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	OK	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	OK	CAN CIRC 9	UNKWN

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A/T Models without EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	OK	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	UNKWN	CAN CIRC 9	UNKWN

MBIB0297E

M/T Models with EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	OK	CAN CIRC 9	UNKWN

MBIB0298E

M/T Models without EPS

OK data		NG data	
DATA MONITOR		DATA MONITOR	
MONITOR	NO DTC	MONITOR	NO DTC
CAN COMM	OK	CAN COMM	OK
CAN CIRC 1	OK	CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN	CAN CIRC 2	UNKWN
CAN CIRC 3	OK	CAN CIRC 3	UNKWN
CAN CIRC 4	OK	CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN	CAN CIRC 5	UNKWN
CAN CIRC 6	OK	CAN CIRC 6	UNKWN
CAN CIRC 7	OK	CAN CIRC 7	UNKWN
CAN CIRC 8	UNKWN	CAN CIRC 8	UNKWN
CAN CIRC 9	UNKWN	CAN CIRC 9	UNKWN

MBIB0299E

>> Go to [LAN-3, "Precautions When Using CONSULT-II"](#) .

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITHOUT EURO-OBDD)]

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR

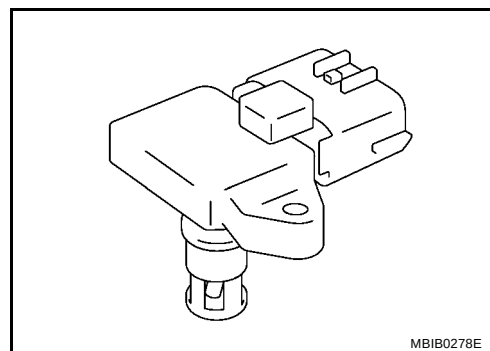
PFP:22365

Component Description

EBS000L8

The manifold absolute pressure (MAP) sensor is placed intake manifold corrector. It detects intake manifold pressure and sends the voltage signal to the ECM, ECM uses the signal to compute intake air volume value.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increase, the voltage rises.



On Board Diagnosis Logic

EBS000L9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0107 0107	Manifold absolute 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.) ● Manifold absolute pressure sensor
P0108 0108	Manifold absolute pressure 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) ● Manifold absolute pressure sensor ● Intake air leaks

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Manifold absolute pressure sensor circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut.

DTC Confirmation Procedure

EBS000LA

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If the 1st trip DTC is detected, go to [EC-510, "Diagnostic Procedure"](#).

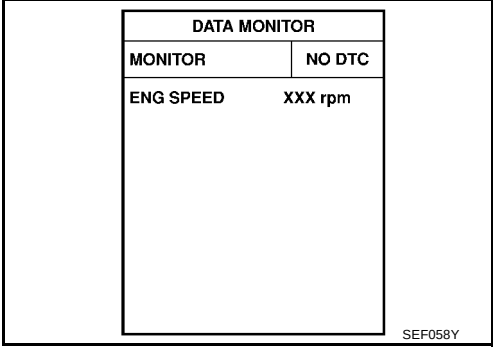


Diagram showing the CONSULT-II DATA MONITOR screen. The screen displays the following information:

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

The label SEF058Y is visible in the bottom right corner of the diagram.

WITHOUT CONSULT-II

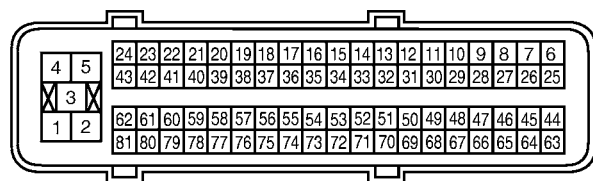
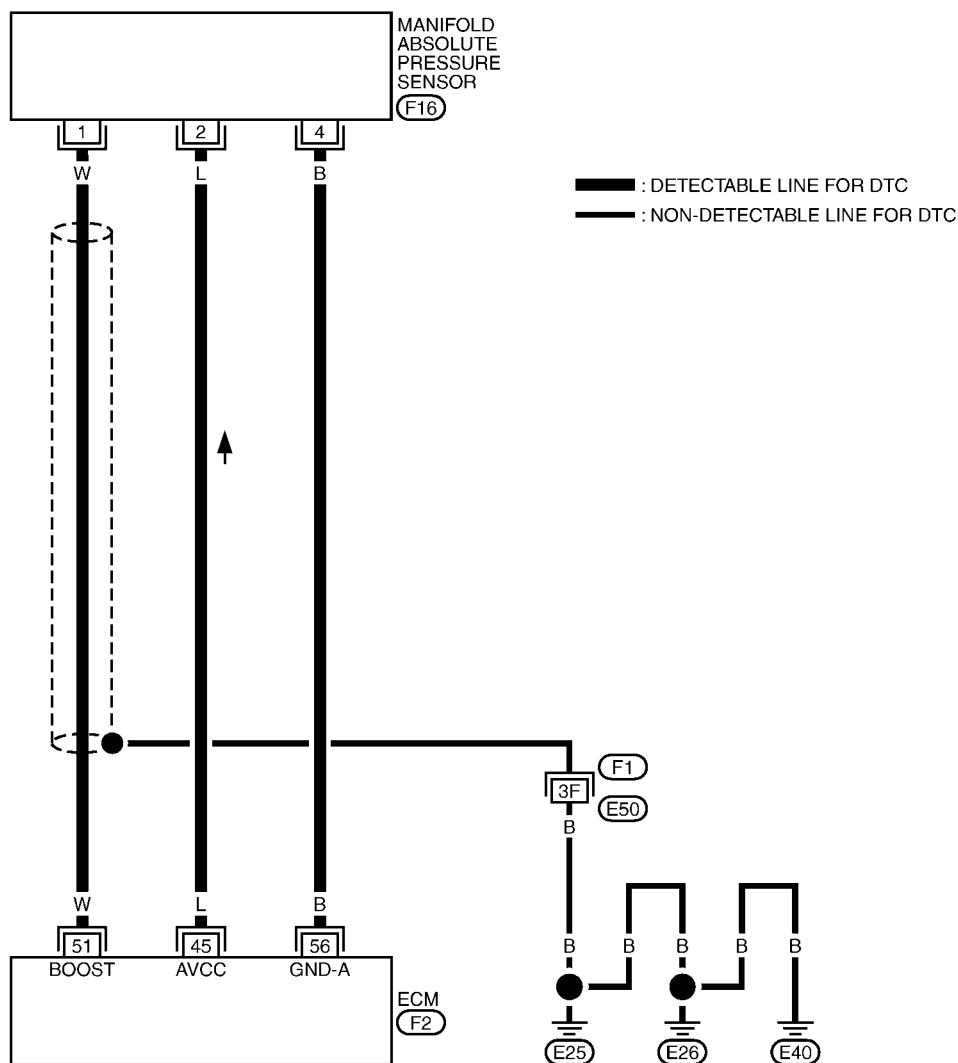
1. Turn ignition switch "ON" and wait at least 5 seconds.
2. Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
3. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4. If 1st trip DTC is detected, go to [EC-510, "Diagnostic Procedure"](#).

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000LB

EC-AP/SEN-01



F2



4 3 2 1

F16
GY

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE
JUNCTION (SMJ)

MBWA0304E

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITHOUT EURO-OBID)]

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.

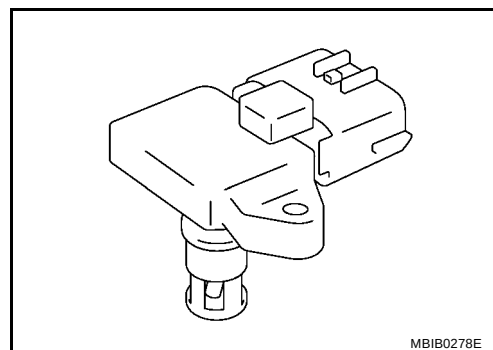
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V

Diagnostic Procedure

EBS000LC

1. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect manifold absolute pressure sensor harness connector.
- Turn ignition switch "ON".



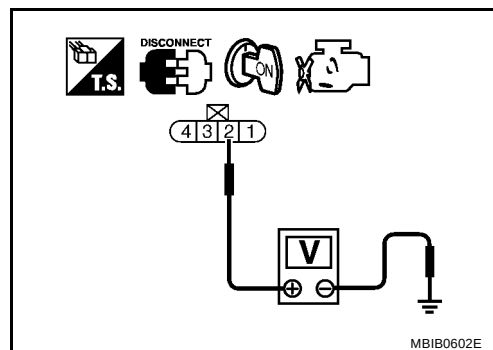
MBIB0278E

- Check voltage between MAP sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 2.
NG >> Repair harness or connectors.



MBIB0602E

2. CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch "OFF".
- Check harness continuity between MAP sensor terminal 4 and ECM terminal 56
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 harness or connectors.

DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITHOUT EURO-OBD)]

3. CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAP sensor terminal 1 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 4.

NG >> Repair harness or connectors.

4. CHECK MAP SENSOR

Refer to [EC-511, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace manifold absolute pressure sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection MANIFOLD ABSOLUTE PRESSURE SENSOR

EBS000LD

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51(manifold absolute pressure sensor signal) and ground.

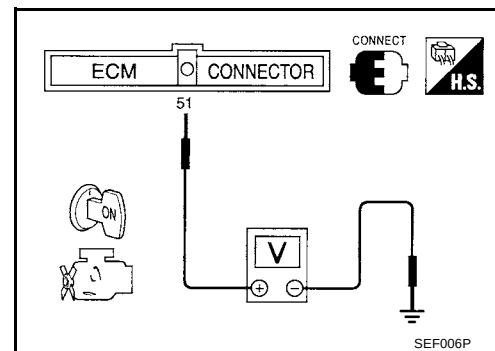
NOTE:

- To avoid the affection of intake manifold vacuum, Check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depends on atmospheric pressure and altitude.

4. Measure the atmospheric pressure.

NOTE:

As atmospheric pressure describe on synoptic chart is value at sea level, please compensate the actual pressure with the following chart.

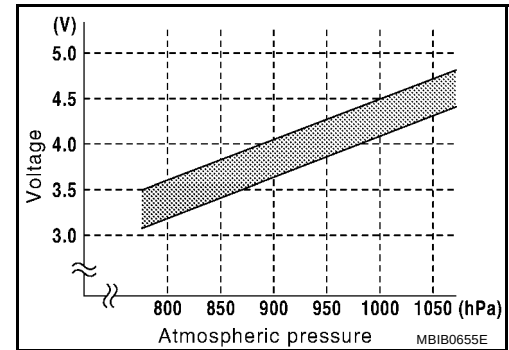


Altitude	Compensated pressure
0m	0hPa
200m	-24hPa
400m	-47hPa
600m	-70hPa
800m	-92hPa
1,000m	-114hPa
1,500m	-168hPa
2,000m	-218hPa

5. Check the manifold absolute pressure sensor value corresponds to the atmospheric pressure.

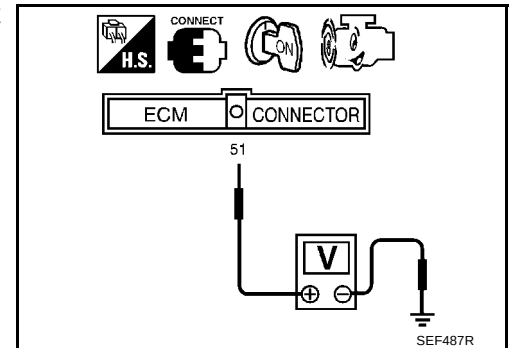
DTC P0107, P0108 MANIFOLD ABSOLUTE PRESSURE SENSOR [CR (WITHOUT EURO-OBD)]

Atmospheric pressure	Voltage
800hPa	3.2 - 3.6v
850hPa	3.4 - 3.8v
900hPa	3.7 - 4.1v
960hPa	3.9 - 4.3v
1,000hPa	4.1 - 4.5v
1,050hPa	4.3 - 4.7v



6. Check the voltage between ECM terminal 51 and ground at idling and confirm the voltage difference between engine is stopped and at idling is within following chart.

Intake manifold vacuum	Voltage difference
-40kPa (-300mmHg)	1.6 - 2.0v
-53.3kPa (-400mmHg)	2.2 - 2.6v
-66.7kPa (-500mm)	2.8 - 3.2v
-80kPa (-600mmHg)	3.4 - 3.8v



Removal and Installation MANIFOLD ABSOLUTE PRESSURE SENSOR

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

EBS000LE

DTC P0117, P0118 ECT SENSOR

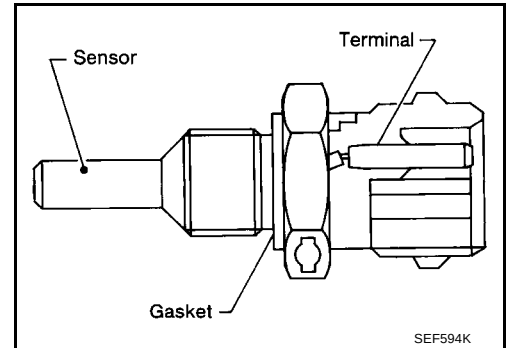
[CR (WITHOUT EURO-OBD)]

DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

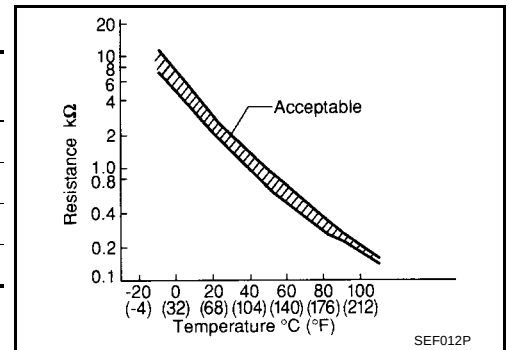
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

*: These data are reference values and are measured between ECM terminal 72 (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

EBS000LG

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 this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

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-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II 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.		

[CR (WITHOUT EURO-OBD)]

DTC Confirmation Procedure

 WITH CONSULT-II

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
- SEF058Y

EC-514

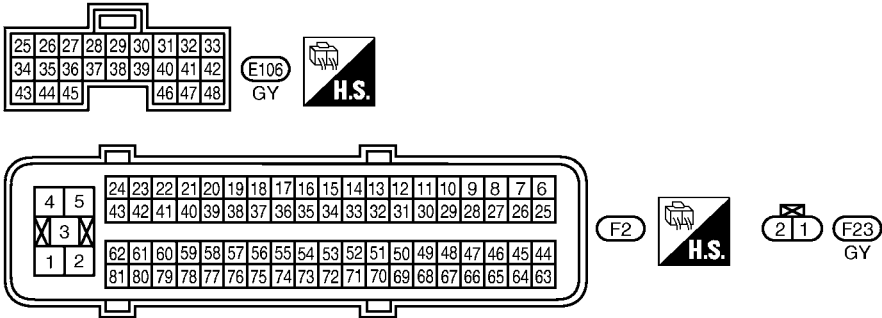
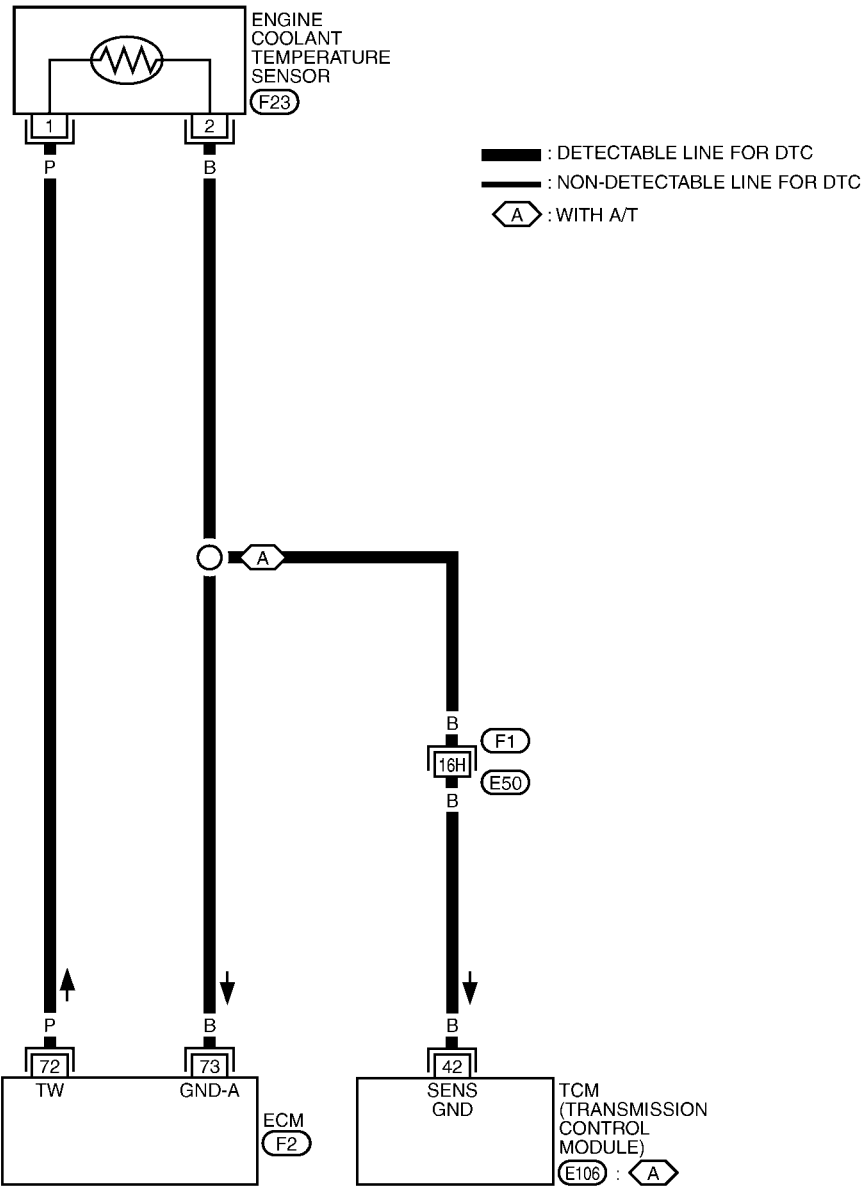
DTC P0117, P0118 ECT SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EC-ECTS-01

EC



REFER TO THE FOLLOWING.
(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0117, P0118 ECT SENSOR

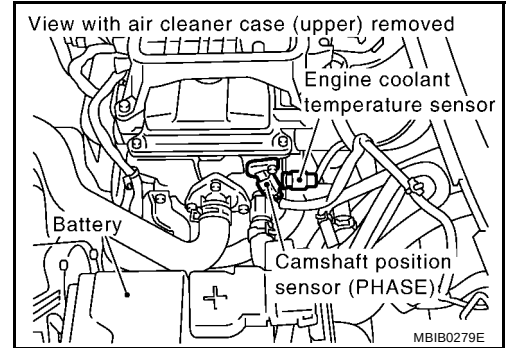
[CR (WITHOUT EURO-OBD)]

EBS000LJ

Diagnostic Procedure

1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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



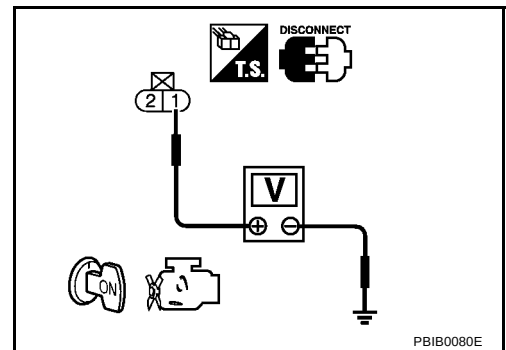
4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 2.

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



2. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between ECT sensor terminal 2 and engine ground. 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 E50, F1
- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM

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

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-517, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace engine coolant temperature sensor.

DTC P0117, P0118 ECT SENSOR

[CR (WITHOUT EURO-OBD)]

5. CHECK INTERMITTENT INCIDENT

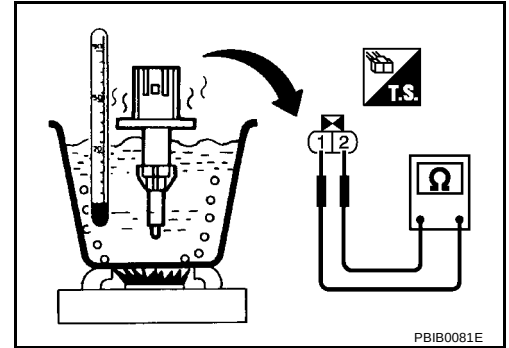
Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection

ENGINE COOLANT TEMPERATURE SENSOR

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

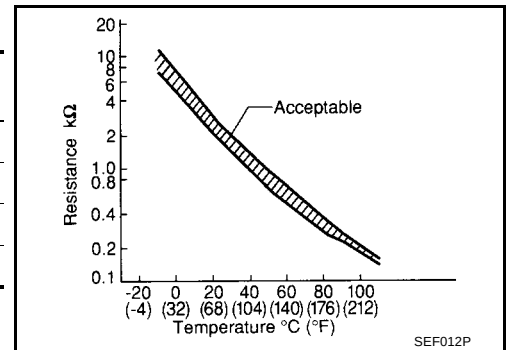


<Reference data>

Engine coolant temperature °C (°F)	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

*: These data are reference values and are measured between ECM terminal 72 (Engine coolant temperature sensor) and ground.

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-22, "THERMOSTAT"](#) .

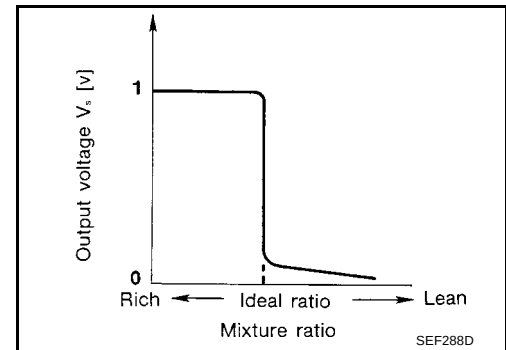
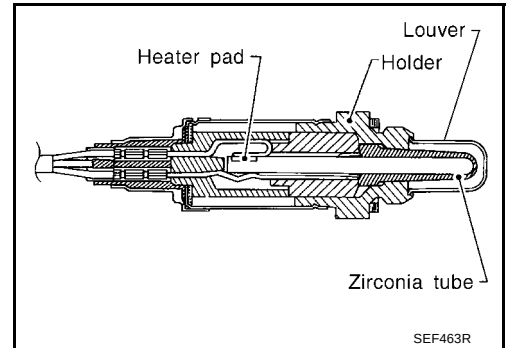
DTC P0132 HO2S1

PFP:22690

Component Description

EBS000LM

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

**CONSULT-II Reference Value in Data Monitor Mode**

EBS000LN

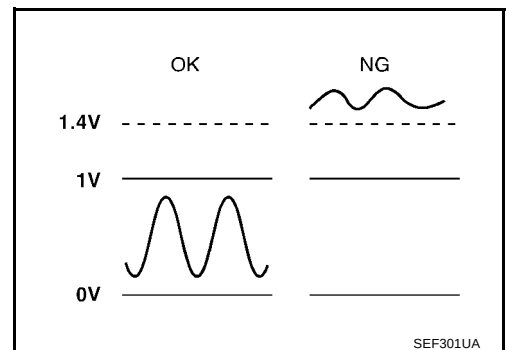
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS000LO

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 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 1

DTC Confirmation Procedure**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-II

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. Select "DATA MONITOR" mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to [EC-521, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

SEF174Y

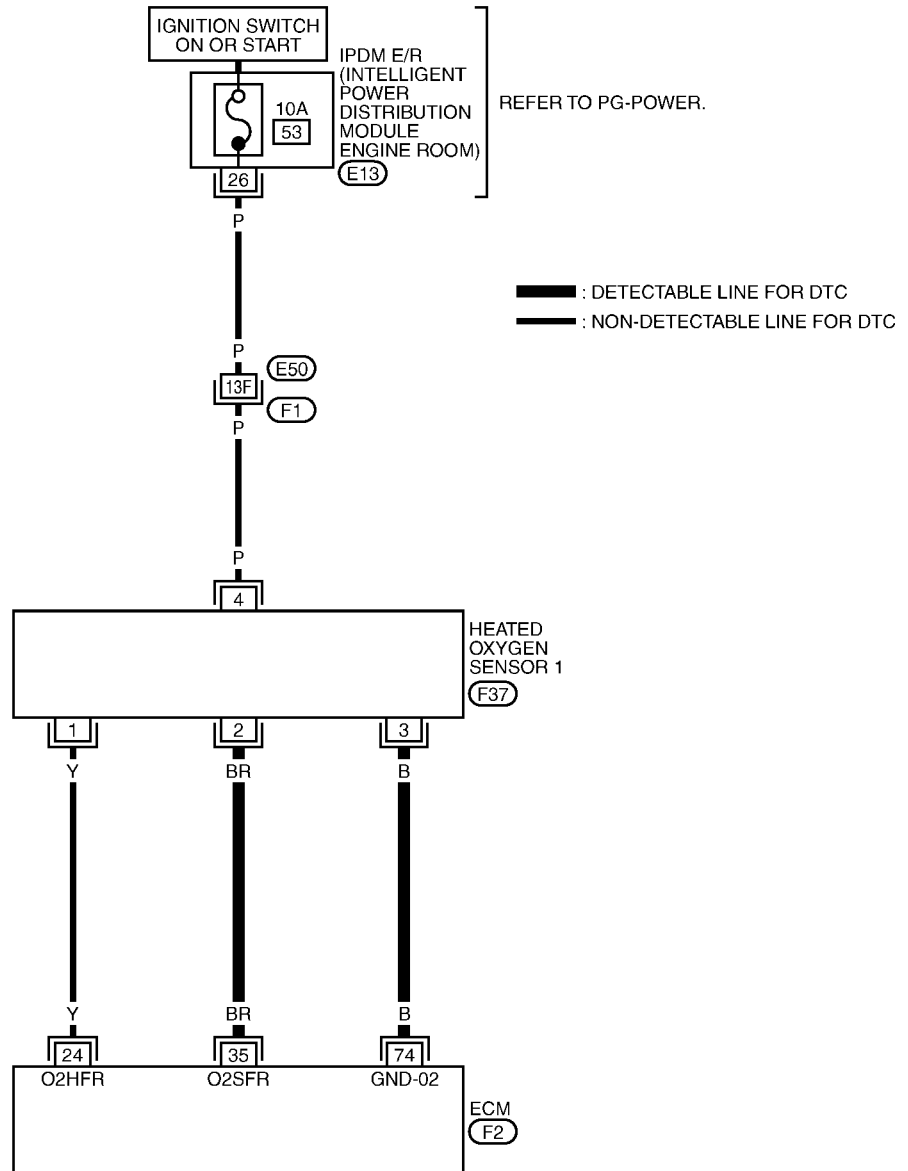
ⓧ WITHOUT CONSULT-II

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 2 minutes.
4. Turn ignition switch "OFF" and wait at least 10 seconds.
5. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6. If 1st trip DTC is detected, go to [EC-521, "Diagnostic Procedure"](#).

Wiring Diagram

EBS000LQ

EC-HO2S1-01

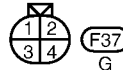


15	16		17	18	19	
20	21	22	23	24	25	26

E13
BR

4	5	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
3	3	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
1	2	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
		81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63

F2



REFER TO THE FOLLOWING.

F1 -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

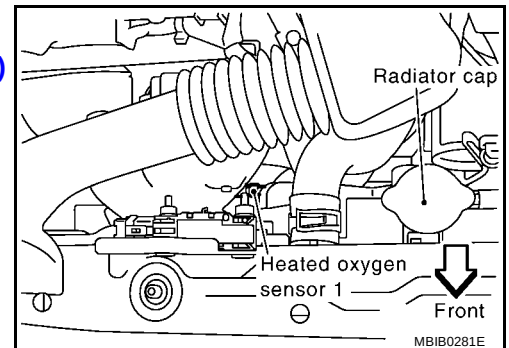
EBS000LR

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch "OFF".
2. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
Refer to Wiring Diagram.

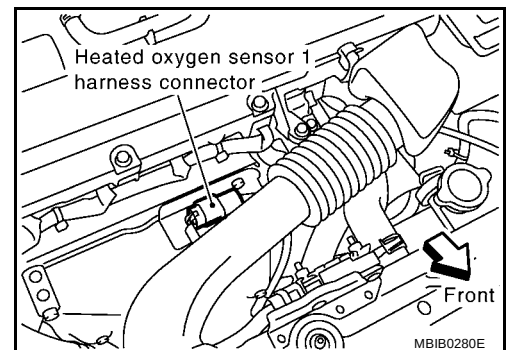
Continuity should exist.

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 power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

4. 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 HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector
3. 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 1

Refer to [EC-522, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS000LS

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

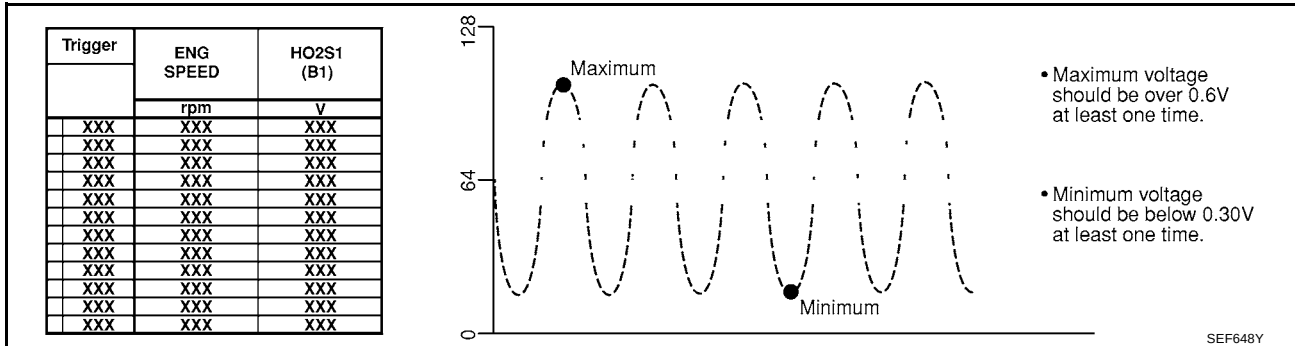
6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

**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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

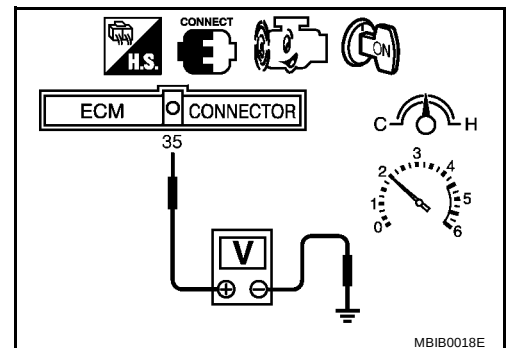
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Removal and Installation

HEATED OXYGEN SENSOR 1

EBS000LT

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

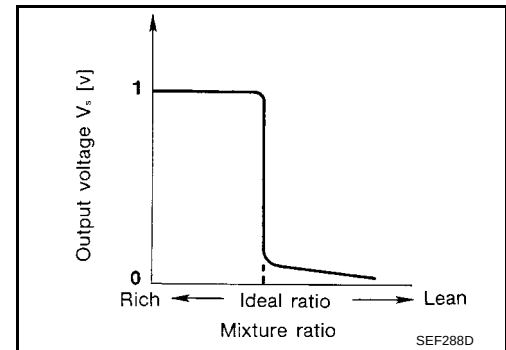
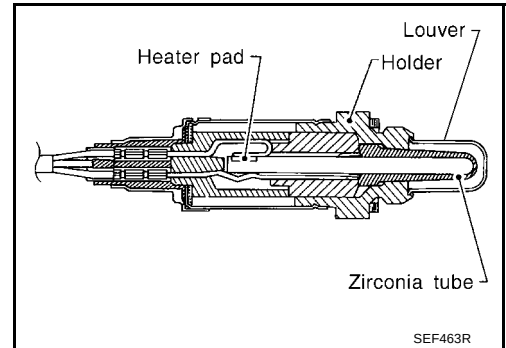
DTC P0134 HO2S1

PFP:22690

Component Description

EBS000LU

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

**CONSULT-II Reference Value in Data Monitor Mode**

EBS000LV

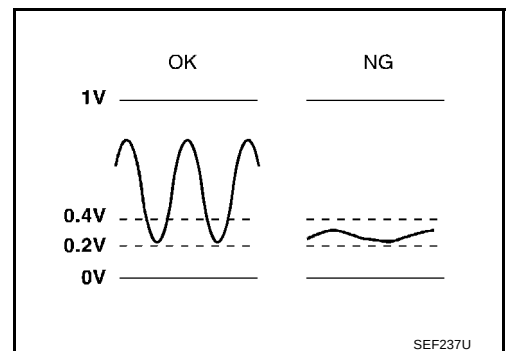
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS000LV

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

Overall Function Check

EBS000LY

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

Ⓟ WITH CONSULT-II

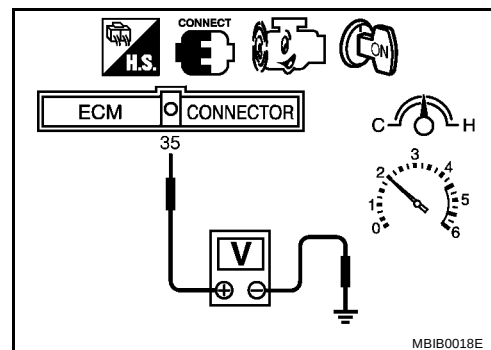
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)".
3. Hold engine speed at 2,000 rpm under no load.
4. Make sure that the indications do not remain in the range between 0.2V to 0.4V.
5. If NG, go to [EC-527, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

⊗ WITHOUT CONSULT-II

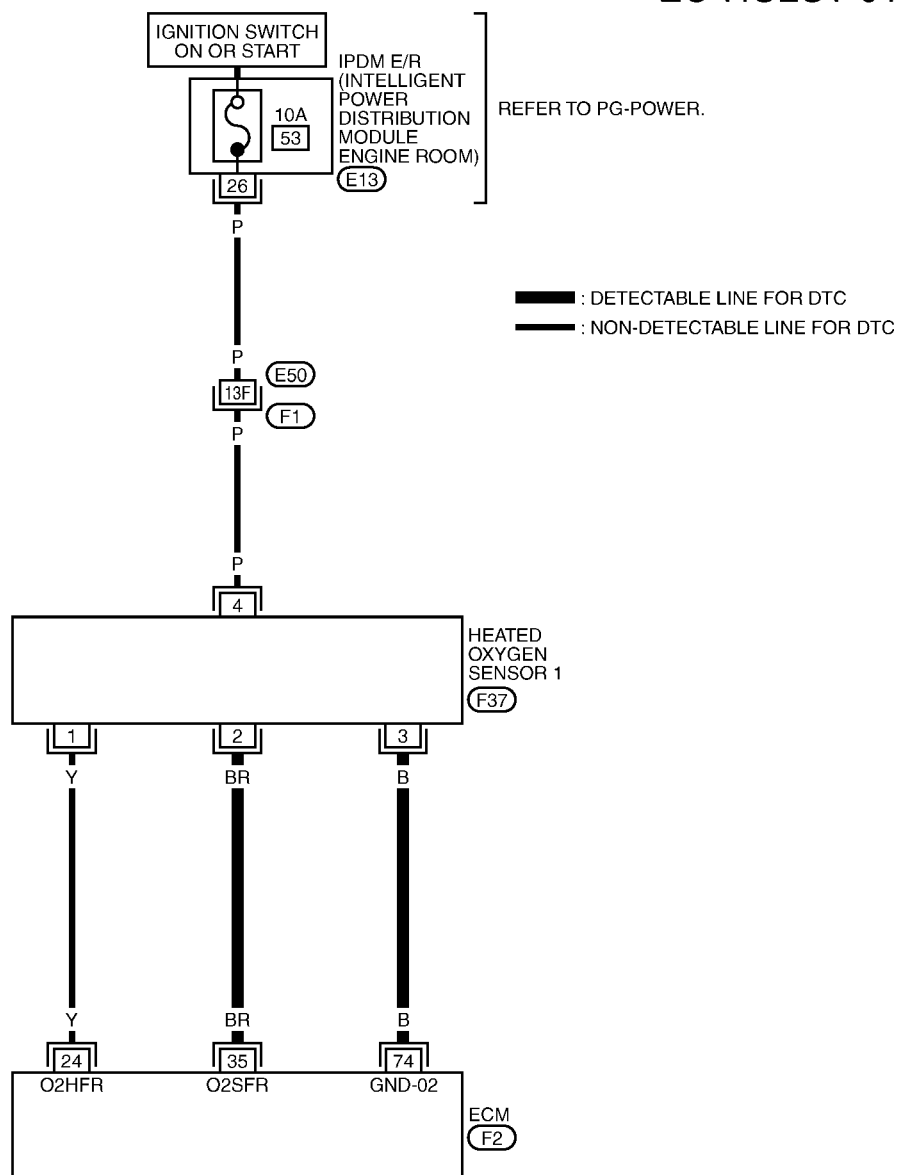
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
4. If NG, go to [EC-527, "Diagnostic Procedure"](#).



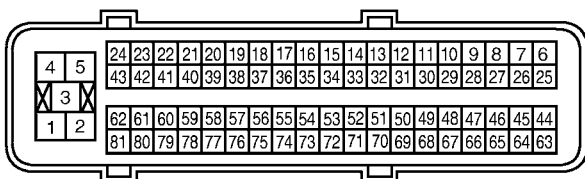
Wiring Diagram

EBS000LZ

EC-HO2S1-01



15	16		17	18	19	
20	21	22	23	24	25	26

(E13
BR

REFER TO THE FOLLOWING.

(F1) -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

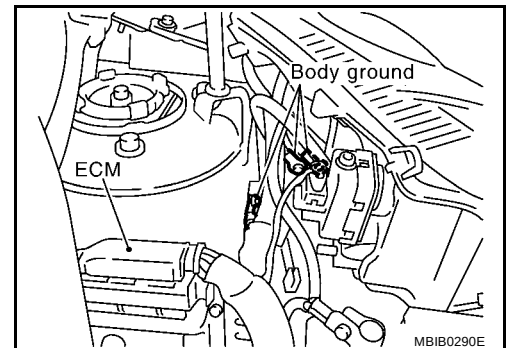
Diagnostic Procedure

EBS000M0

1. INSPECTION START

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

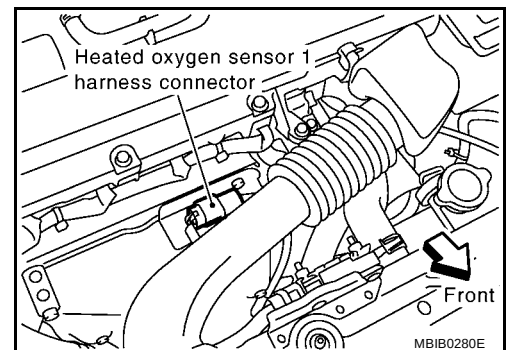
Continuity should exist.

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 power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

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 HEATED OXYGEN SENSOR 1

Refer to [EC-528, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS000M1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

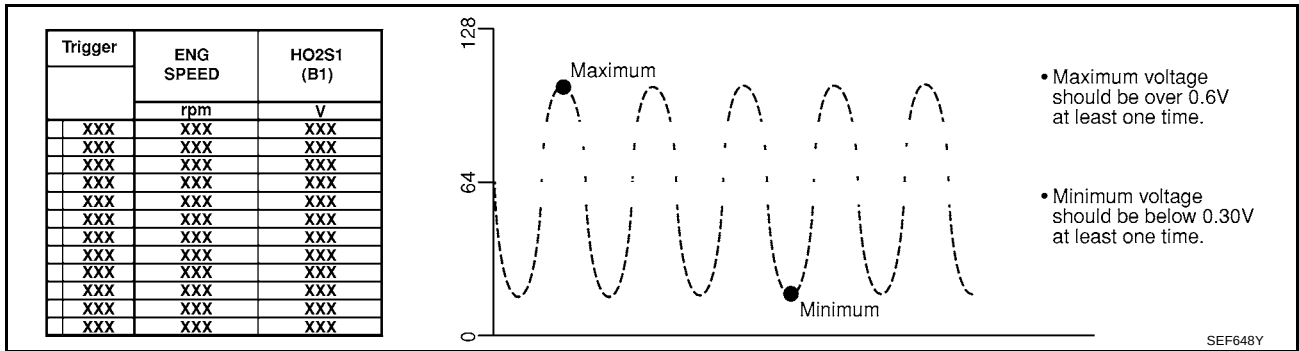
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R	L	R	L	R
R means HO2S1 MNTR (B1) indicates RICH					
L means HO2S1 MNTR (B1) indicates LEAN					

SEF217YA



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

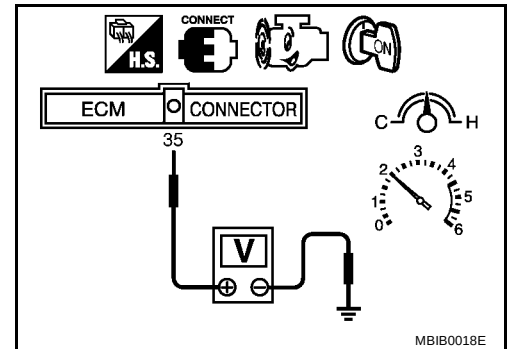
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Removal and Installation
HEATED OXYGEN SENSOR 1**

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#).

DTC P0138 HO2S2

PFP:226A0

Component Description

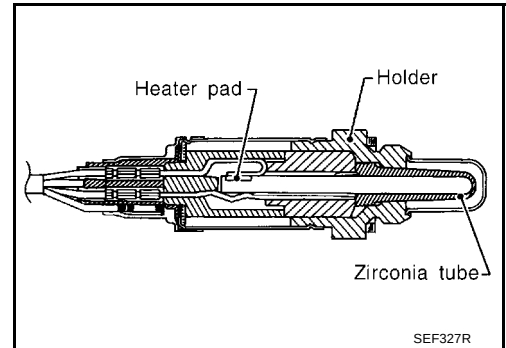
EBS000M3

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the heated oxygen 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-II Reference Value in Data Monitor Mode**

EBS000M4

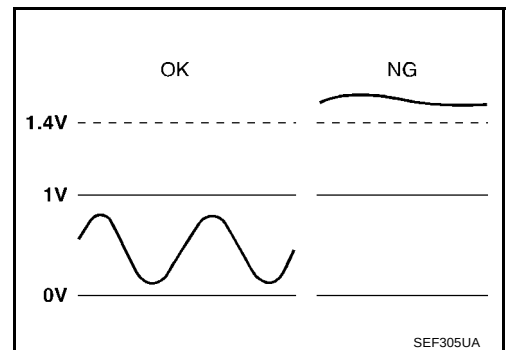
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.		LEAN ↔ RICH

On Board Diagnosis Logic

EBS000M5

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen 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 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	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

DTC Confirmation Procedure

EBS000M6

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-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to [EC-533, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

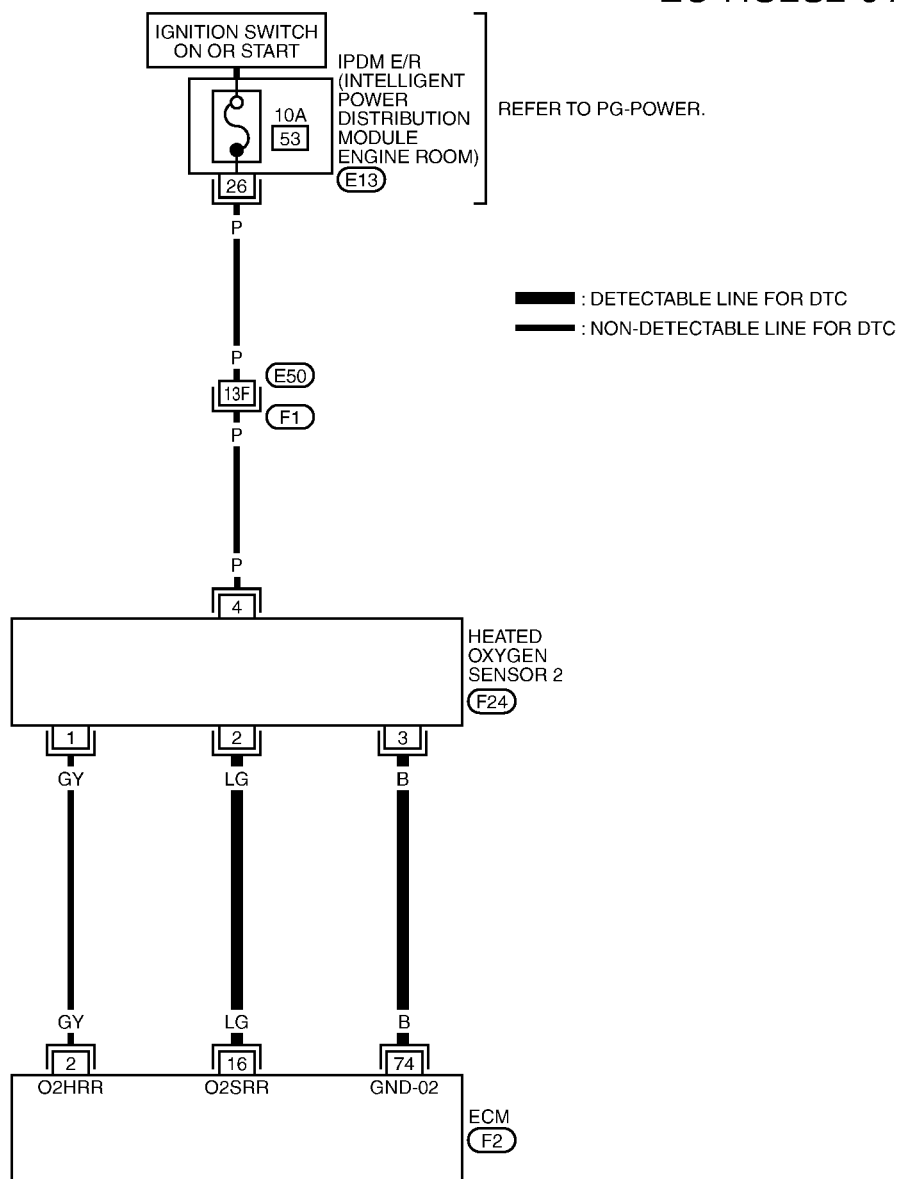
WITHOUT CONSULT-II

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 one minute under no load.
4. Let engine idle for two minutes.
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 at least one minute under no load.
7. Let engine idle for two minutes.
8. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
9. If 1st trip DTC is detected, go to [EC-533, "Diagnostic Procedure"](#).

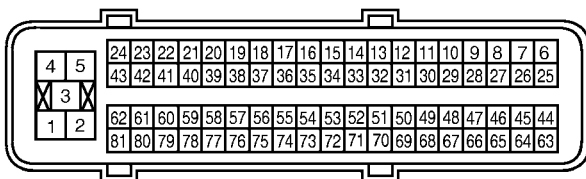
Wiring Diagram

EBS000M7

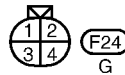
EC-HO2S2-01



15	16		17	18	19	
20	21	22	23	24	25	26

(E13)
BR

(F2)

(F24)
G

REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

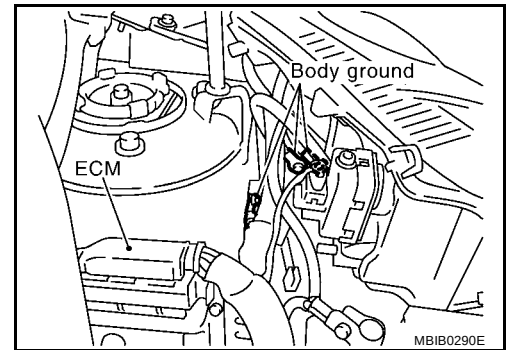
Diagnostic Procedure

EBS000MB

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

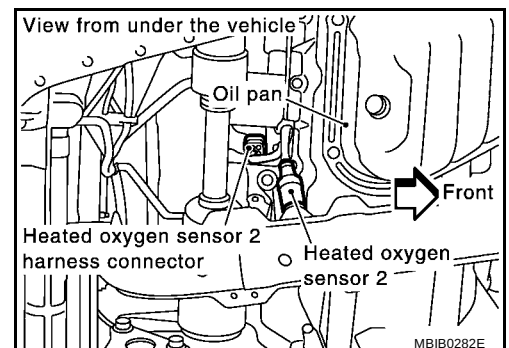
Continuity should exist.

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

OK or NG

OK >> GO TO 3.

NG >> Repair open circuit 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 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

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 HEATED OXYGEN SENSOR 2

Refer to [EC-534, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS000M9

With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

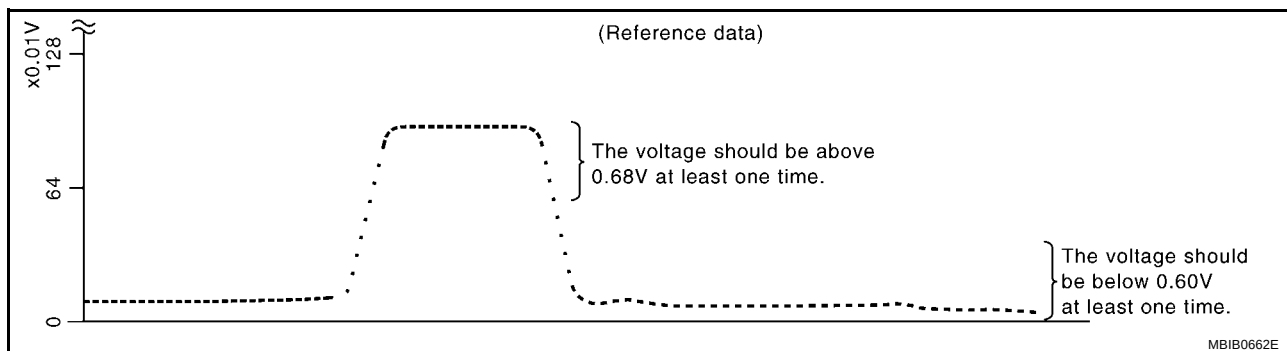
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2(B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

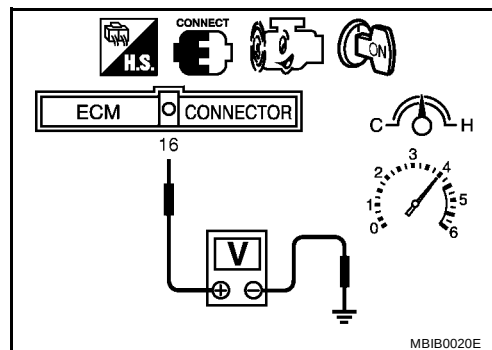
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine 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 idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Removal and Installation
HEATED OXYGEN SENSOR 2**

Refer to [EX-3, "EXHAUST SYSTEM"](#).

EBS000OMA

DTC P0221 TP SENSOR

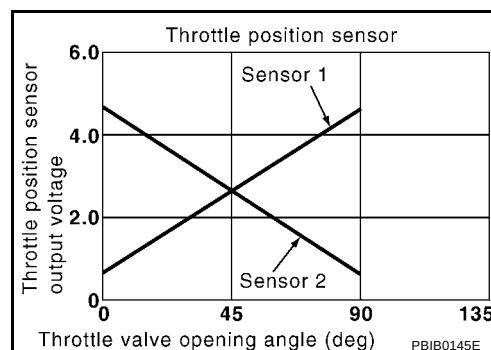
PFP:16119

Component Description

EBS00OMB

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-II Reference Value in Data Monitor Mode

EBS00OMC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	Shift lever: D (A/T model) 1st (M/T model)	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

EBS00OMD

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0221 0221	Throttle position sensor circuit range/performance problem	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.) - Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

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

EBS00OME

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-539, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

ⓧ WITHOUT CONSULT-II

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-539, "Diagnostic Procedure"](#) .

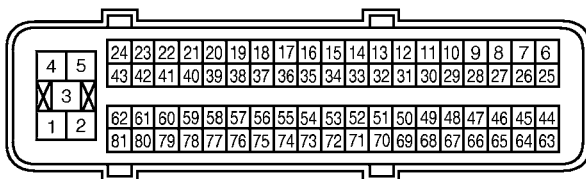
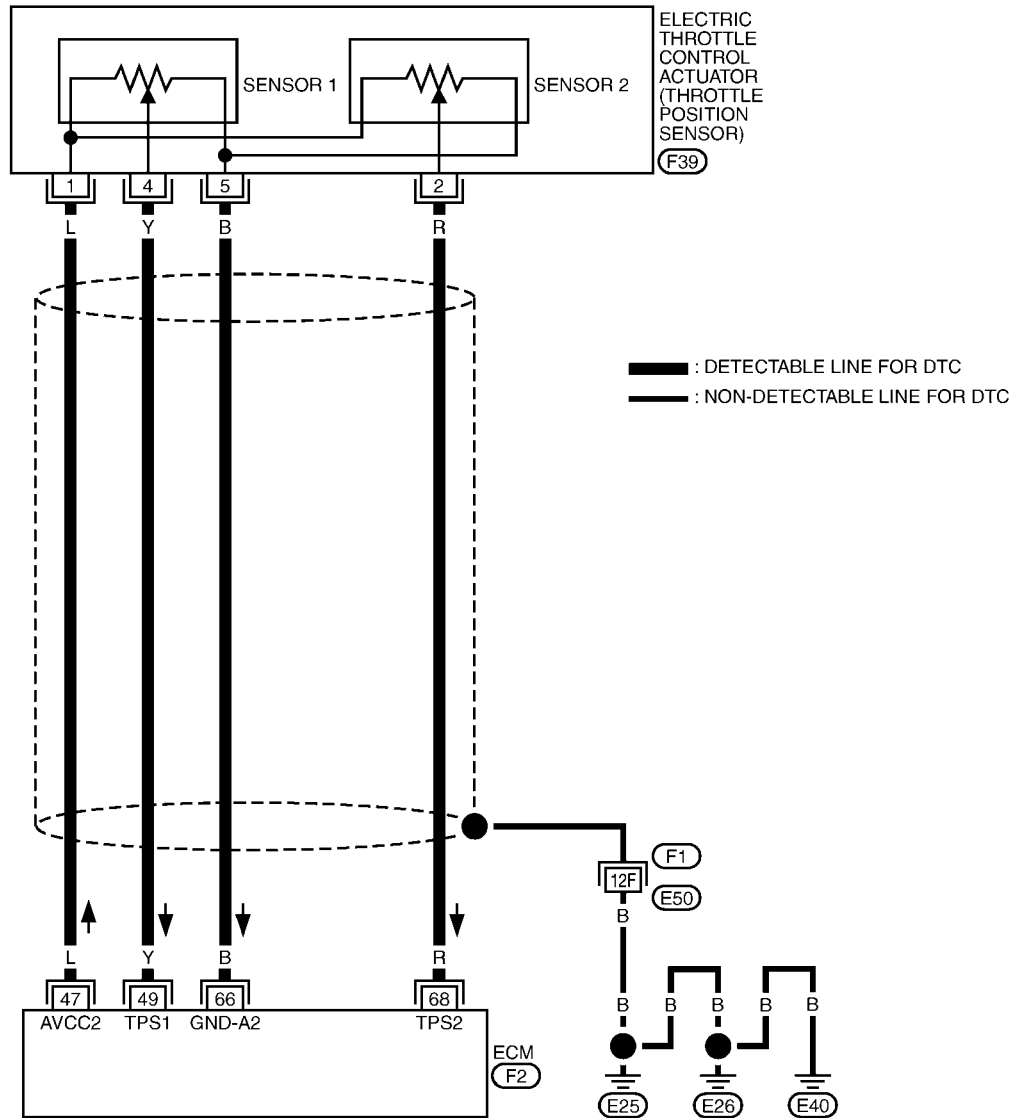
DTC P0221 TP SENSOR

[CR (WITHOUT EURO-OBD)]

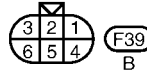
Wiring Diagram

EBS000MF

EC-TPS3-01



(F2)



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0275E

DTC P0221 TP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

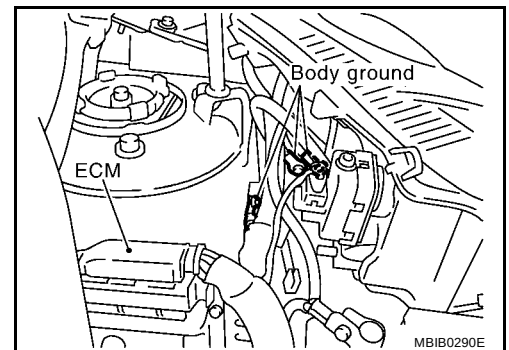
Diagnostic Procedure

EBS000MG

1. RETIGHTEN GROUND SCREWS

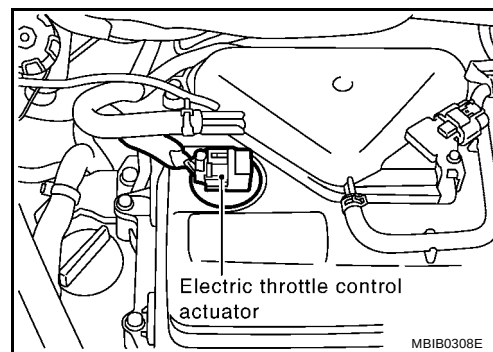
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



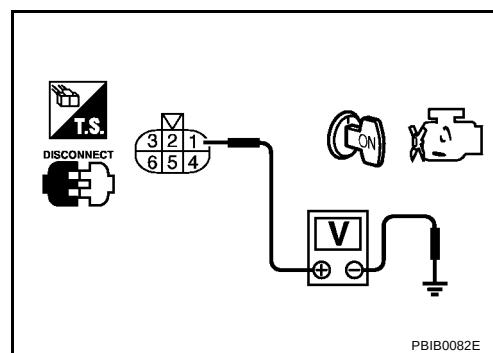
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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.



3. 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4, ECM terminal 68 and electric throttle control actuator terminal 2. 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 THROTTLE POSITION SENSOR

Refer to [EC-541, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

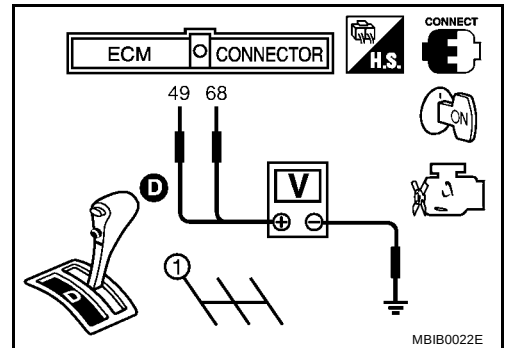
Component Inspection THROTTLE POSITION SENSOR

EBS000MH

1. Reconnect all harness connectors disconnected.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (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-435, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-435, "Idle Air Volume Learning"](#) .



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS000MI

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P0222, P0223 TP SENSOR

[CR (WITHOUT EURO-OBD)]

DTC P0222, P0223 TP SENSOR

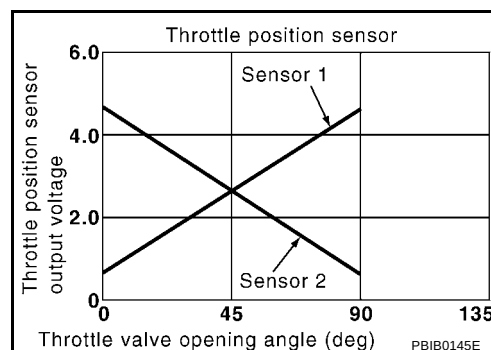
PFP:16119

Component Description

EBS000MJ

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-II Reference Value in Data Monitor Mode

EBS000MK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T model) 1st (M/T model)	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

EBS000ML

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.) ● Electric throttle control actuator (TP sensor 1)
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, the ECM enters fail-safe mode and the MI 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

EBS000MM

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.

DTC P0222, P0223 TP SENSOR

[CR (WITHOUT EURO-OBD)]

④ WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-545, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ WITHOUT CONSULT-II

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-545, "Diagnostic Procedure"](#) .

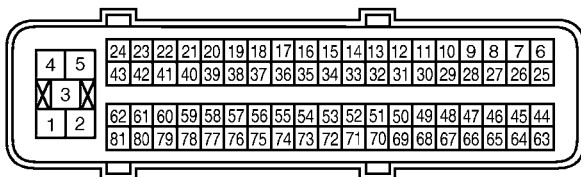
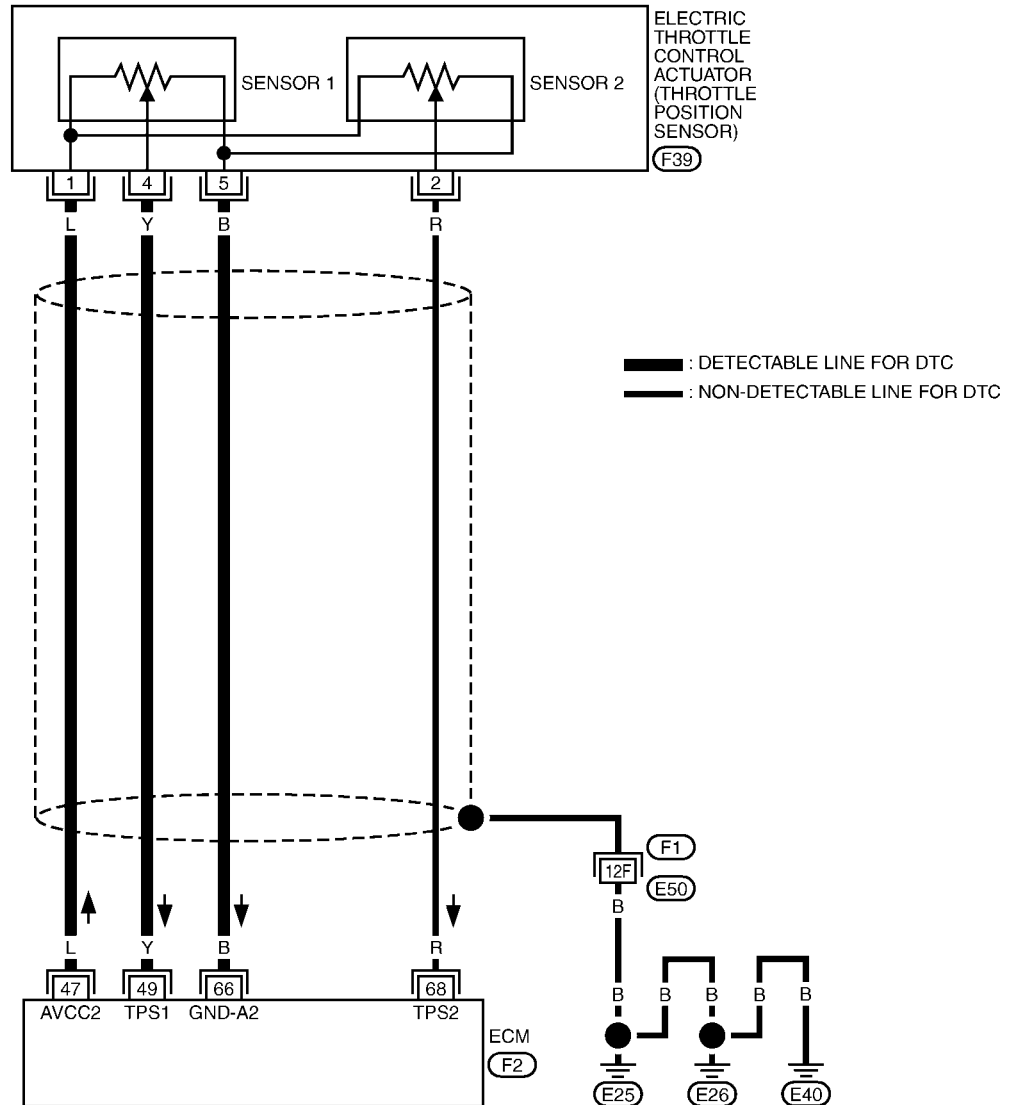
DTC P0222, P0223 TP SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000MN

EC-TPS1-01



(F2)



(F39) B

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0276E

DTC P0222, P0223 TP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

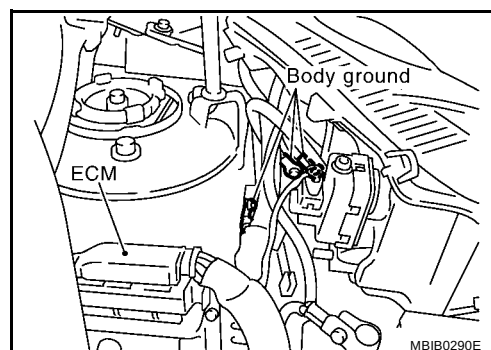
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

Diagnostic Procedure

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

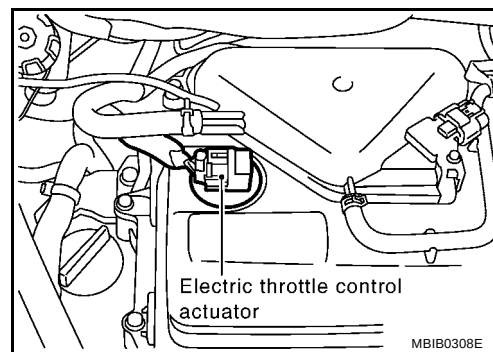


DTC P0222, P0223 TP SENSOR

[CR (WITHOUT EURO-OBD)]

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



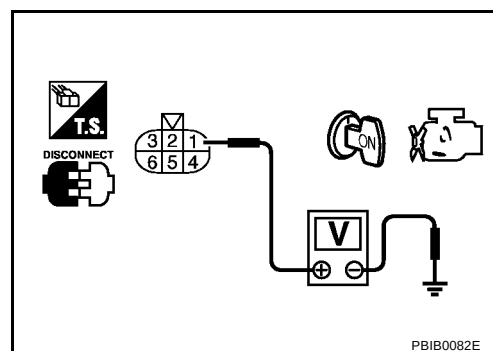
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4. 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 THROTTLE POSITION SENSOR

Refer to [EC-547, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

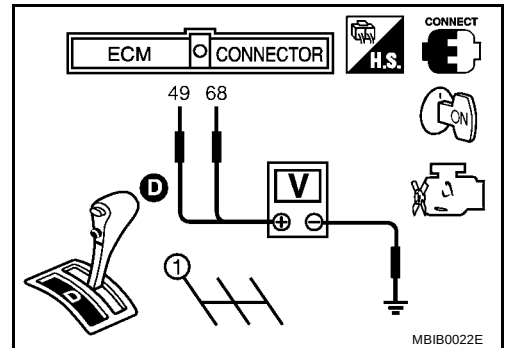
Component Inspection THROTTLE POSITION SENSOR

EBS000MP

1. Reconnect all harness connectors disconnected.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (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-435, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-435, "Idle Air Volume Learning"](#) .



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS000MQ

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P0226 APP SENSOR

PFP:18002

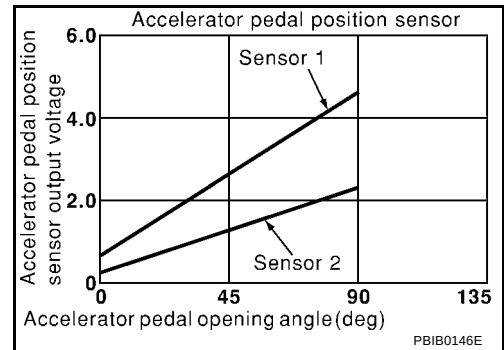
Component Description

EBS000MR

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-II Reference Value in Data Monitor Mode**

EBS000MS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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

EBS000MT

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0226 0226	Accelerator pedal position sensor circuit range/performance problem	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.) ● Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

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

EBS000MU

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.

④ WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-553, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ WITHOUT CONSULT-II

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-553, "Diagnostic Procedure"](#) .

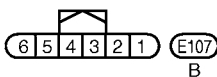
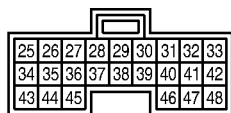
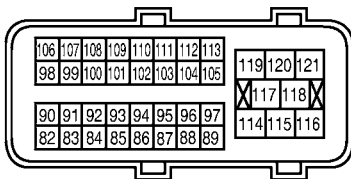
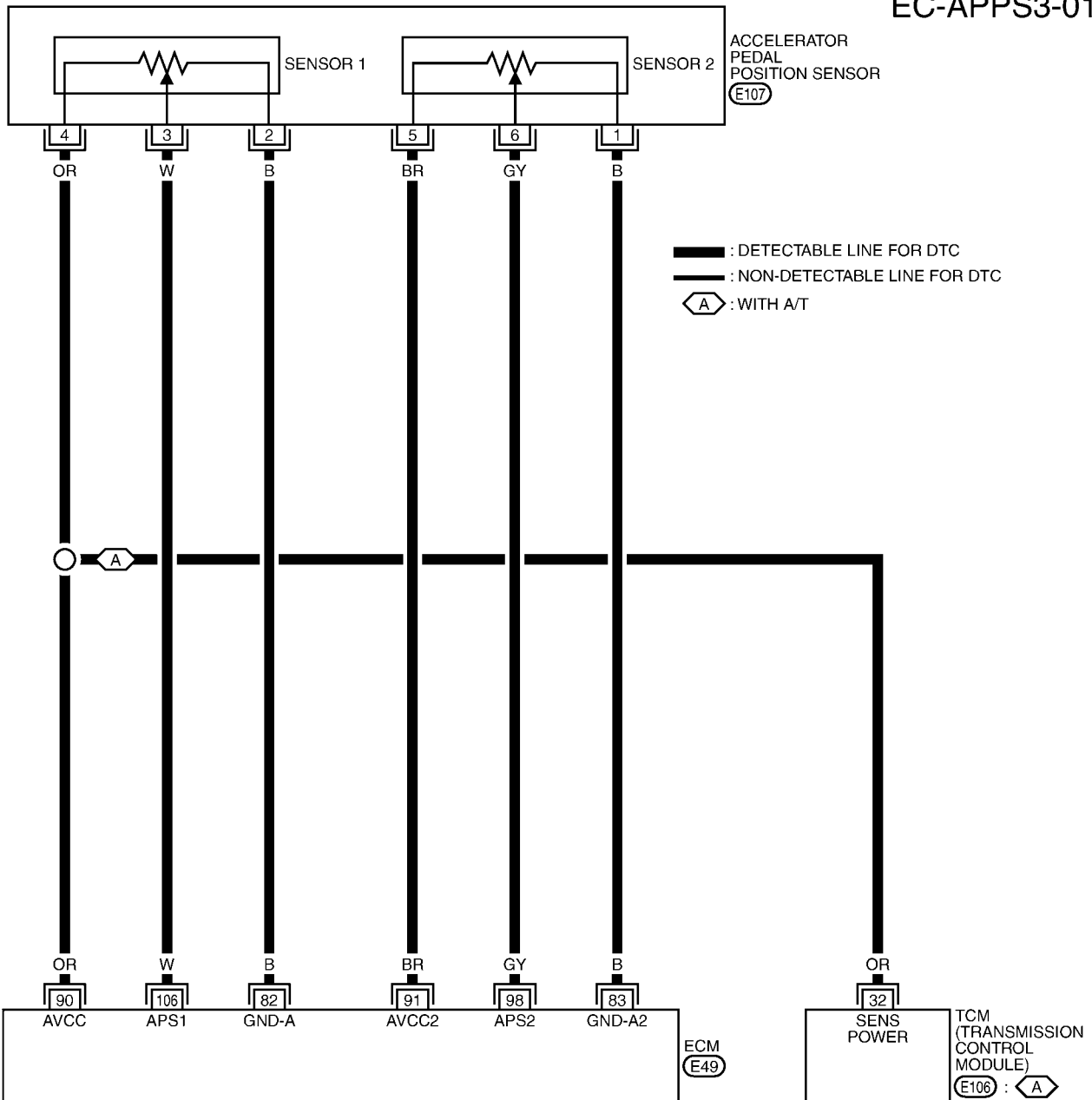
DTC P0226 APP SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram LHD MODELS

EBS000MV

EC-APPS3-01



DTC P0226 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

[CR (WITHOUT EURO-OBD)]

EC-APPS3-02

DTC P0226 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

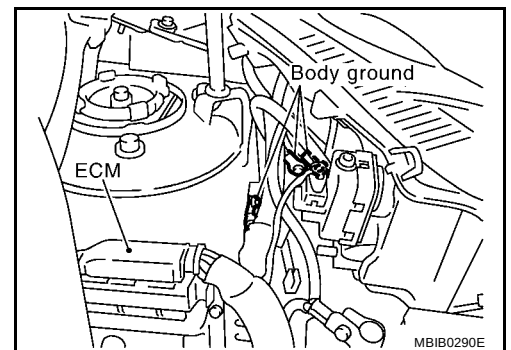
Diagnostic Procedure

EBS000MW

1. RETIGHTEN GROUND SCREWS

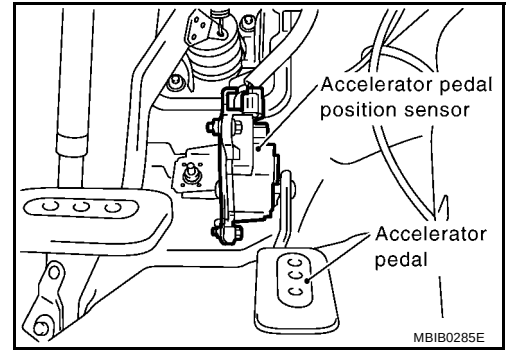
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

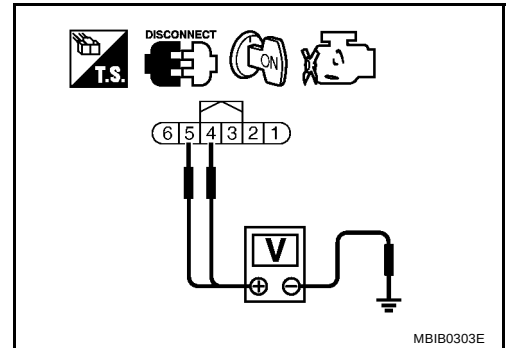


3. Check voltage between APP sensor terminals 4, 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 2, ECM terminal 83 and APP sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor
- Harness for open or short between TCM and accelerator pedal position sensor

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

6. 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 8.

NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-556, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

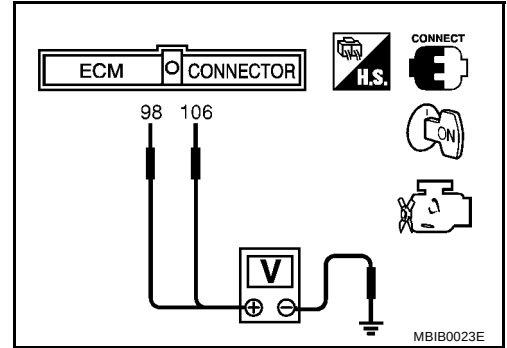
Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection**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 engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-435, "Idle Air Volume Learning"](#) .

Remove and Installation**ACCELERATOR PEDAL**

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

DTC P0227, P0228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

DTC P0227, P0228 APP SENSOR

PFP:18002

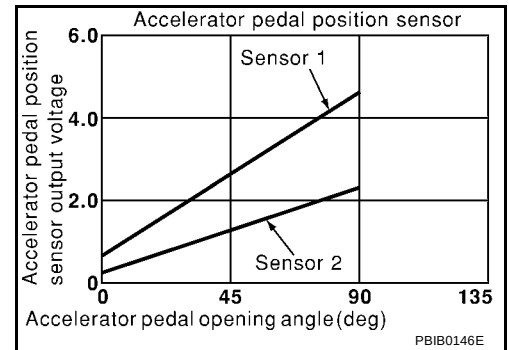
Component Description

EBS000MZ

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-II Reference Value in Data Monitor Mode

EBS000N0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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

EBS000N1

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	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)
P0228 0228	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, the ECM enters fail-safe mode and the MI 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

EBS000N2

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.

[CR (WITHOUT EURO-OBD)]

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-562, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

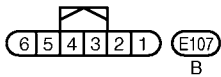
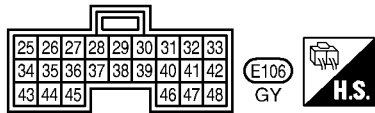
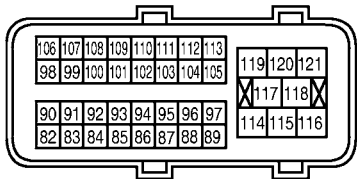
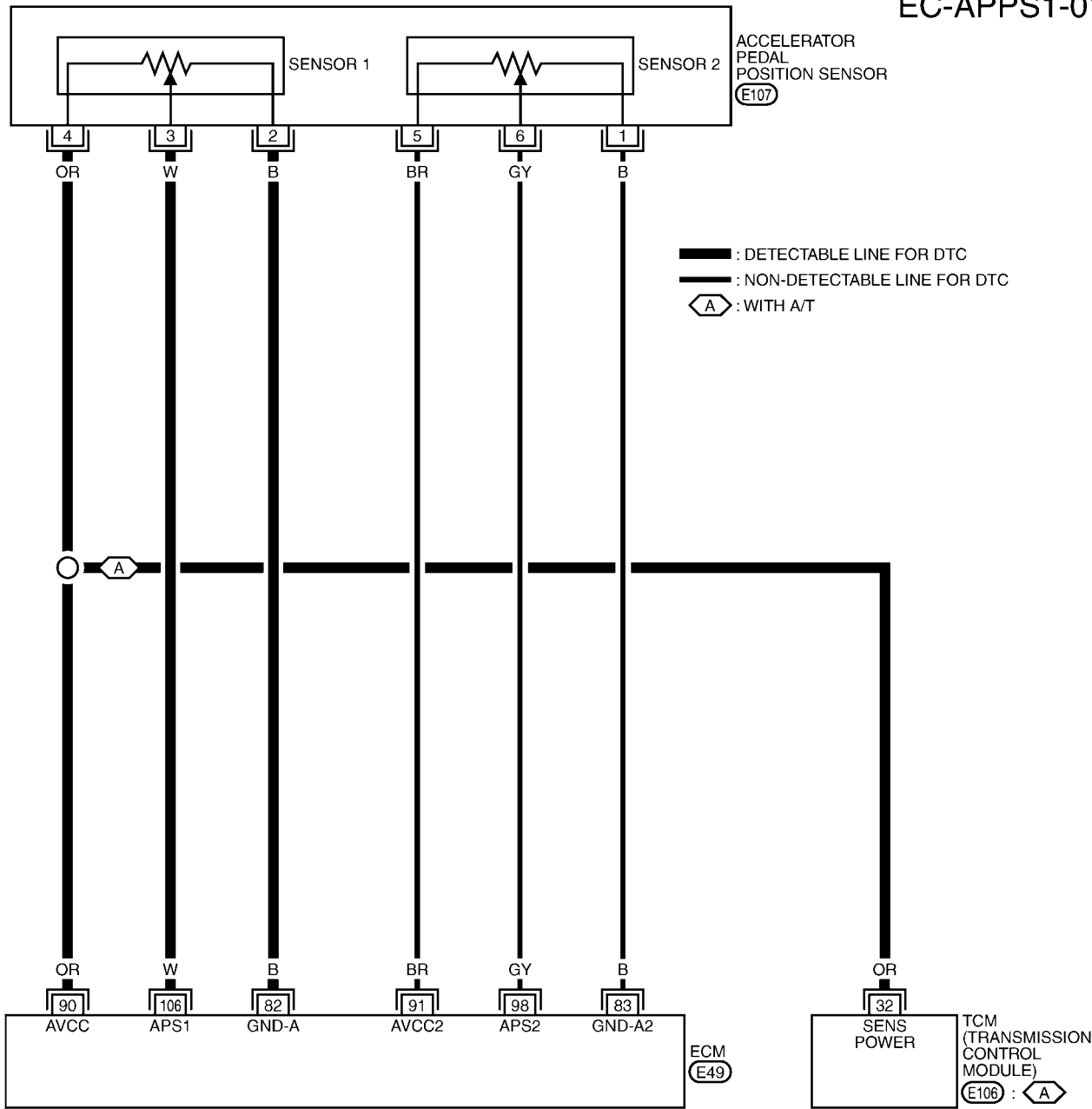
1. Start engine and let it idle for 1 second.
2. Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
3. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4. If DTC is detected, go to [EC-562, "Diagnostic Procedure"](#).

DTC P0227, P0228 APP SENSOR
[CR (WITHOUT EURO-OB)]

Wiring Diagram
LHD MODELS

EBS000N3

EC-APPS1-01



DTC P0227, P0228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

[CR (WITHOUT EURO-OBD)]

EC-APPS1-02



(M1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P0227, P0228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

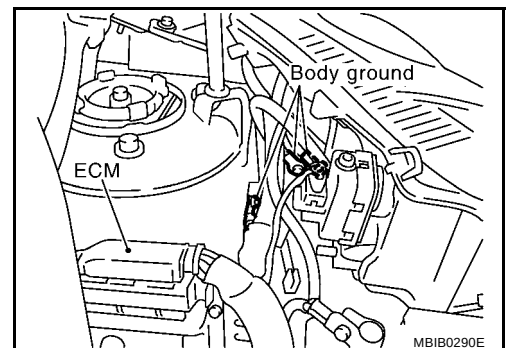
Diagnostic Procedure

EBS000N4

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

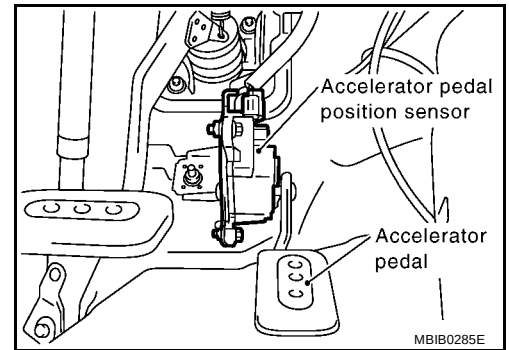


DTC P0227, P0228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

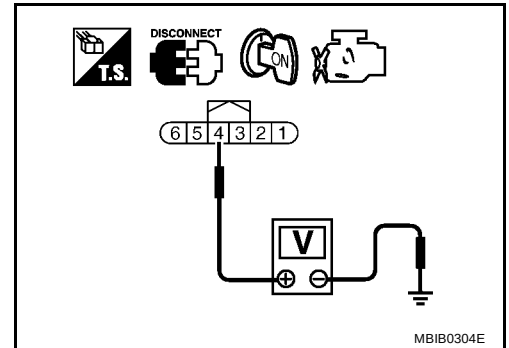


3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. 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 ECM terminal 82 and APP sensor 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 M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

6. CHECK APP SENSOR 1 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 8.

NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M1, E101 (RHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-564, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END**

Component Inspection
ACCELERATOR PEDAL POSITION SENSOR

EBS000N5

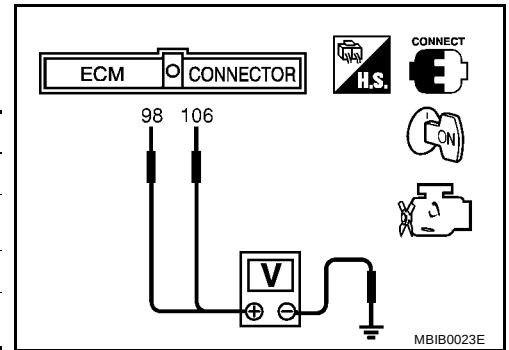
1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".

DTC P0227, P0228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-435, "Idle Air Volume Learning"](#) .

Remove and Installation

ACCELERATOR PEDAL

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

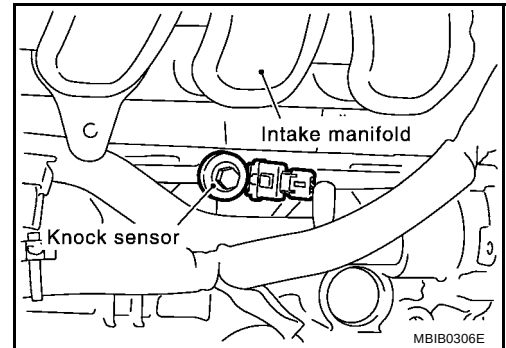
DTC P0327, P0328 KS

PFP:22060

Component Description

EBS000S6

The knock sensor 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.

**On Board Diagnosis Logic**

EBS000S7

The MI will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	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
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

EBS000S8

NOTE:

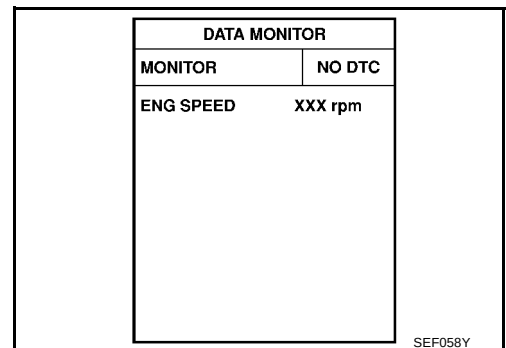
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

① WITH CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-568, "Diagnostic Procedure"](#).

**② WITHOUT CONSULT-II**

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-568, "Diagnostic Procedure"](#).

Wiring Diagram

EBS000S9

EC-KS-01

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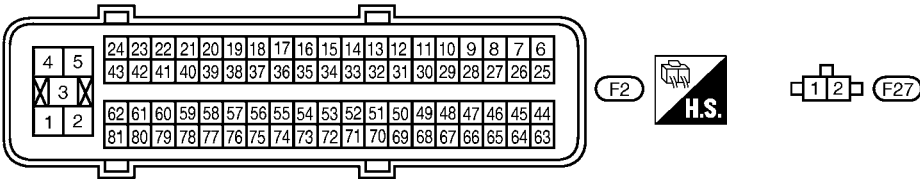
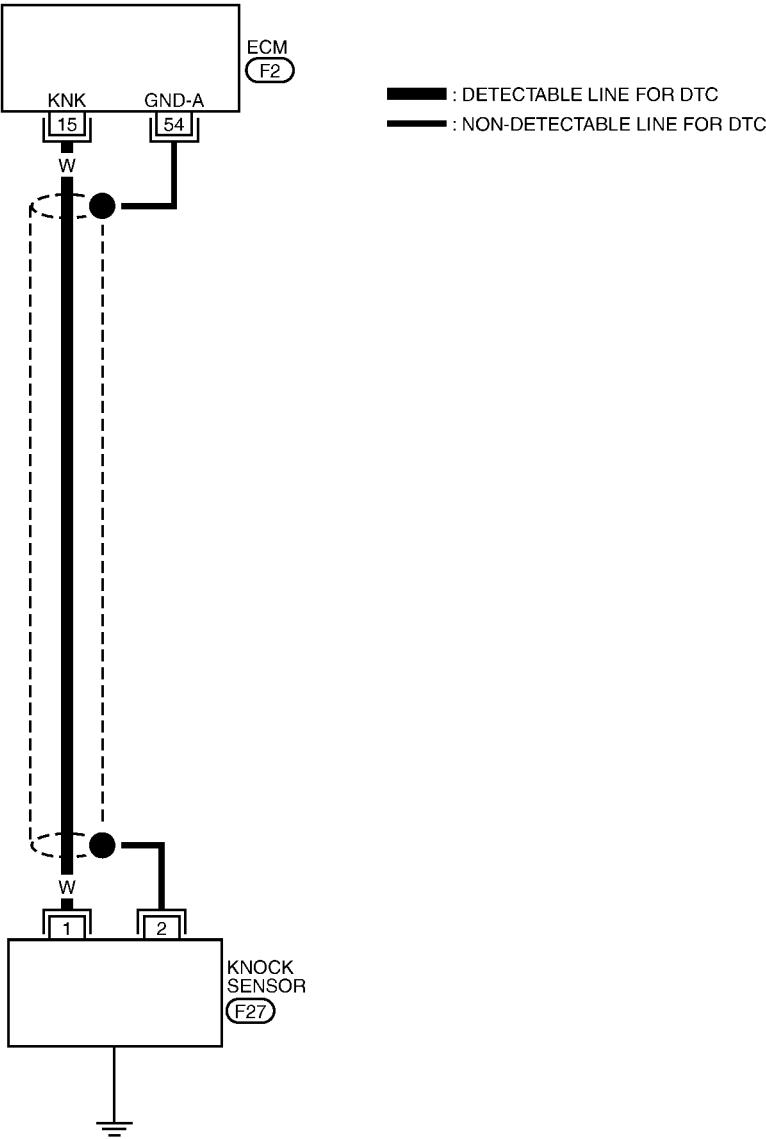
I

J

K

L

M



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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
54	—	Sensors' ground (Knock sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS000SA

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and engine ground. Refer to Wiring Diagram.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

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

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

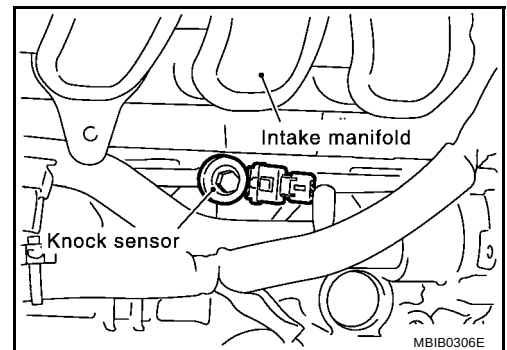
1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

- OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

**3. CHECK KNOCK SENSOR**

Refer to [EC-569, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace knock sensor.

4. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 54 and engine ground.

Continuity should exist

2. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection KNOCK SENSOR

EBS000SB

Check resistance between knock sensor terminal 1 and ground.

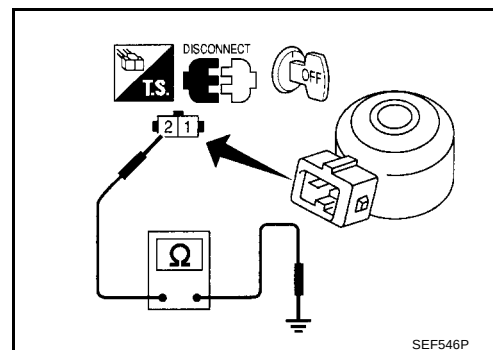
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



EBS000SC

Removal and Installation KNOCK SENSOR

Refer to [EM-69, "CYLINDER BLOCK"](#) .

DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

EBS000NA

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.

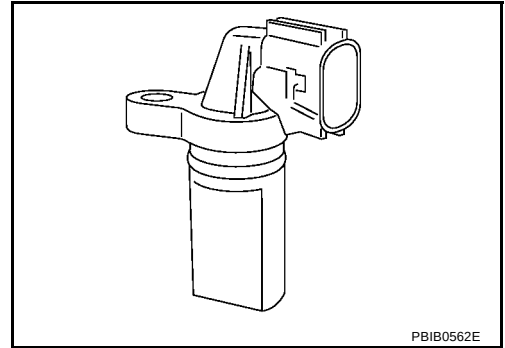
The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS000NB

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

EBS000NC

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

EBS000ND

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-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-573. "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

⊗ WITHOUT CONSULT-II

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-573, "Diagnostic Procedure"](#).

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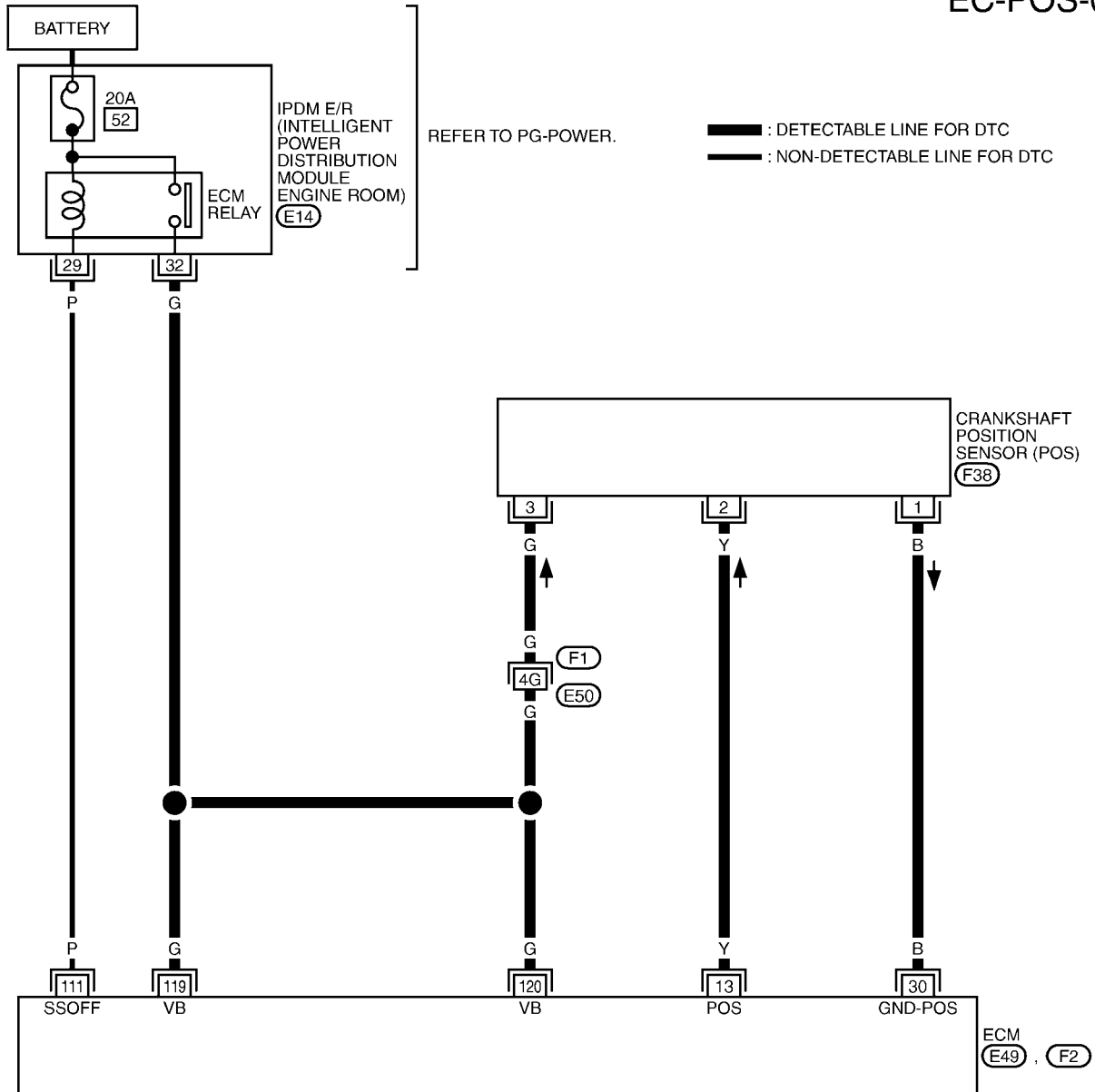
DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000NE

EC-POS-01



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

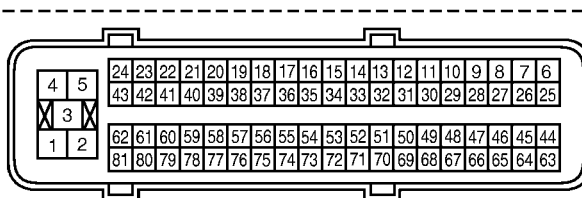
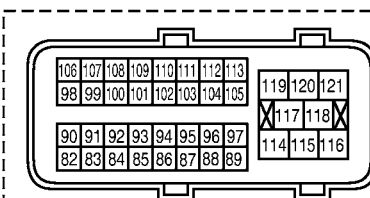
(E14)
W



3 2 1 (F38)
G

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE
JUNCTION (SMJ)



MBWA0282E

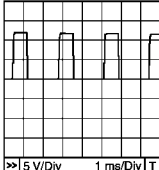
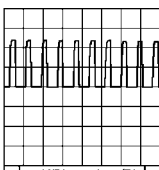
DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	Y	Crankshaft position sensor (POS)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E
30	B	Sensors' ground (Crankshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

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

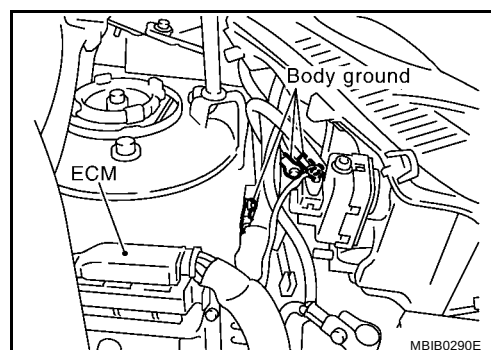
Diagnostic Procedure

EBS000NF

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

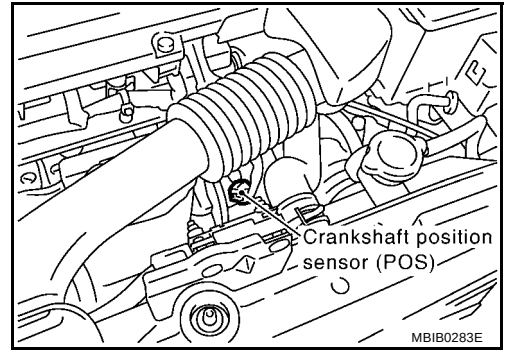


DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch "ON".



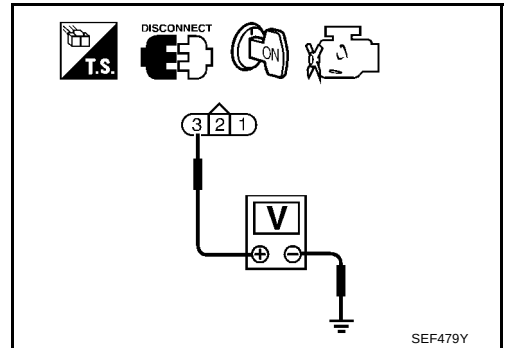
3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. 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 F1, E50
- 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. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for 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.

DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

5. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2.
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 6.

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

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-575, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.

NG >> Replace the signal plate.

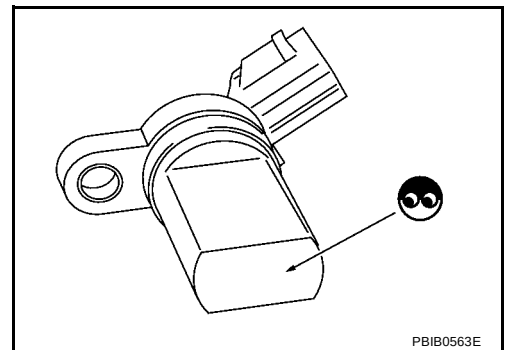
8. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection 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.



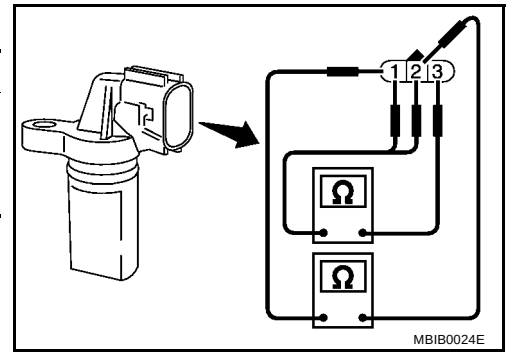
DTC P0335 CKP SENSOR (POS)

[CR (WITHOUT EURO-OBD)]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	

6. If NG, replace crankshaft position sensor (POS).



EBS000NH

Removal and Installation CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-69, "CYLINDER BLOCK"](#) .

DTC P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

EBS000NI

The camshaft position sensor (PHASE) senses the retraction with intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

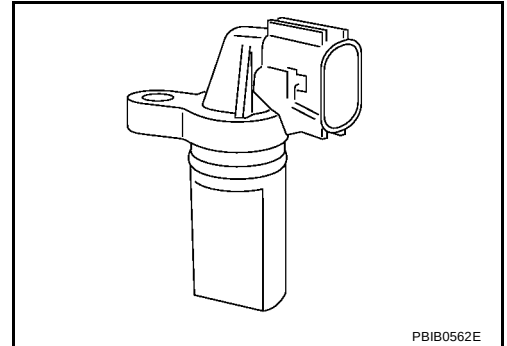
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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.



PBIB0562E

On Board Diagnosis Logic

EBS000NJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set 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-27.) ● Starting system circuit (Refer to SC-27.) ● Dead (Weak) battery

DTC Confirmation Procedure

EBS000NK

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to [EC-580, "Diagnostic Procedure"](#).
If 1st trip DTC is not detected, go to next step.
5. Maintain engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to [EC-580, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
COOLANT TEMP/S	XXX °C

SEF013Y

⊗ WITHOUT CONSULT-II

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-580, "Diagnostic Procedure"](#).
If 1st trip DTC is not detected, go to next step.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start engine and maintain engine speed at more than 800 rpm for at least 5 seconds.

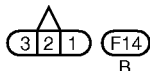
DTC P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

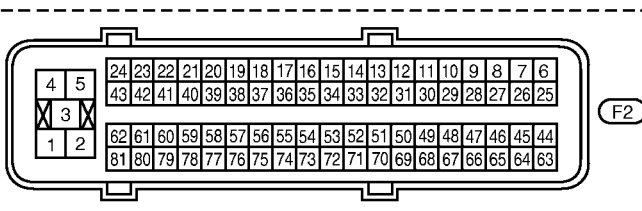
7. Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
8. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
9. If 1st trip DTC is detected, go to [EC-580, "Diagnostic Procedure"](#).

[CR (WITHOUT EURO-OBD)]

EBS00ONL



F1 -SUPER MULTIPLE
JUNCTION (SMJ)



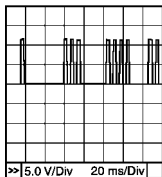
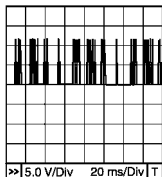
DTC P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	[Engine is running] ● Warm-up condition ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
29	B	Sensors' ground (Camshaft position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

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

Diagnostic Procedure

EBS000NM

1. CHECK STARTING SYSTEM

Turn ignition switch to "START" position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

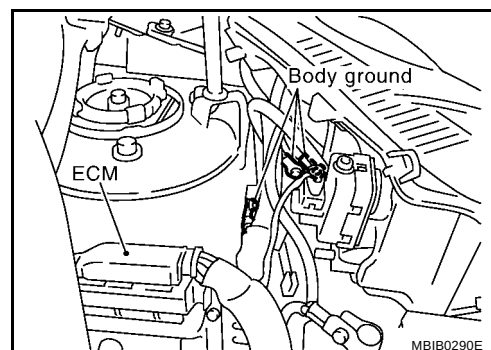
Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-27, "STARTING SYSTEM"](#).)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 3.

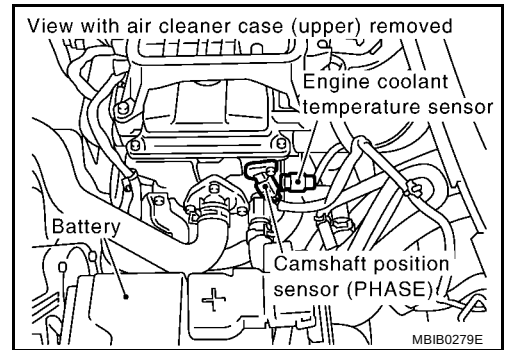


DTC P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch "ON".



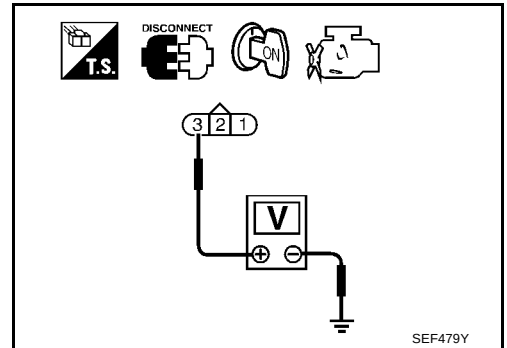
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

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 F1, E50
- 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. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground. 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 P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or 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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-582, "Component Inspection"](#) .

OK or NG

OK >> GO TO 8.

NG >> Replace camshaft position sensor (PHASE).

8. CHECK CAMSHAFT (INTAKE)

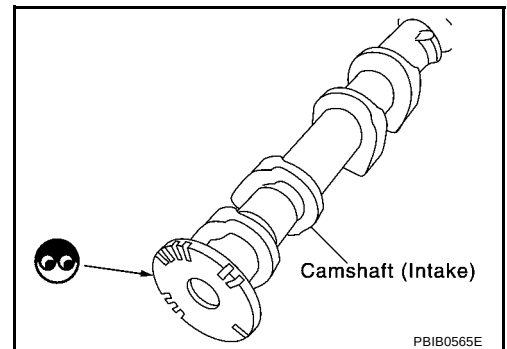
Check the following.

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

OK or NG

OK >> GO TO 9.

NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

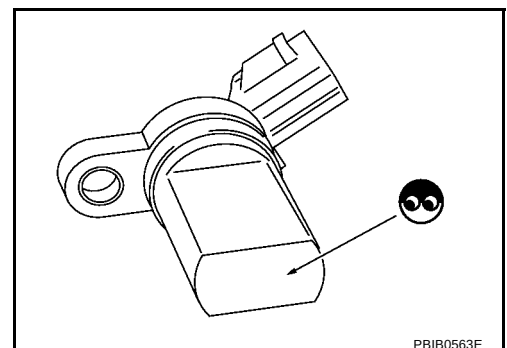
Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection CAMSHAFT POSITION SENSOR (PHASE)

EBS000NN

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.

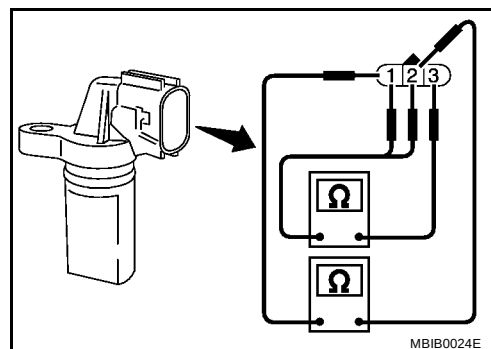


DTC P0340 CMP SENSOR (PHASE)

[CR (WITHOUT EURO-OBD)]

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EM-34, "CAMSHAFT"](#) .

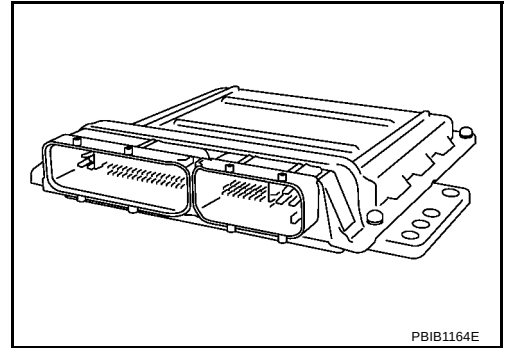
DTC P0605 ECM

PFP:23710

Component Description

EBS000NP

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



PB1B1164E

On Board Diagnosis Logic

EBS000NQ

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 EEPROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when 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.

DTC Confirmation Procedure

EBS000NR

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 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-II**

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-586, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Without CONSULT-II

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 DTC is detected, go to [EC-586, "Diagnostic Procedure"](#) .

PROCEDURE FOR MALFUNCTION B

④ With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4. If 1st trip DTC is detected, go to [EC-586, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ Without CONSULT-II

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-586, "Diagnostic Procedure"](#) .

PROCEDURE FOR MALFUNCTION C

④ With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to [EC-586, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ Without CONSULT-II

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 procedure, 32 times.
4. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5. If 1st trip DTC is detected, go to [EC-586, "Diagnostic Procedure"](#) .

Diagnostic Procedure

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-584](#) .
5. Is the 1st trip DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch "ON".
2. Erase the "Diagnostic Test Mode II (Self-diagnostic results)" memory. Refer to [EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .
3. **Perform "DTC Confirmation Procedure".**
See [EC-584](#) .
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 [EC-443, "NATS \(Nissan Anti-theft System\)"](#) .
3. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
4. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

DTC P1065 ECM POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

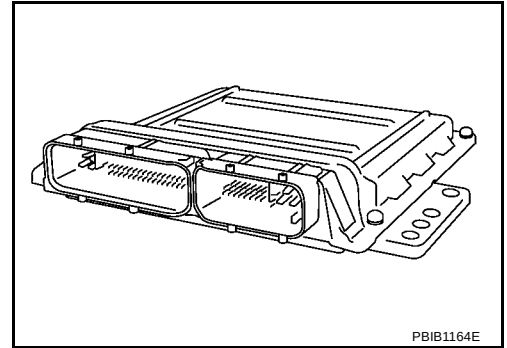
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

EBS000NT

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.



EBS000NU

On Board Diagnosis Logic

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

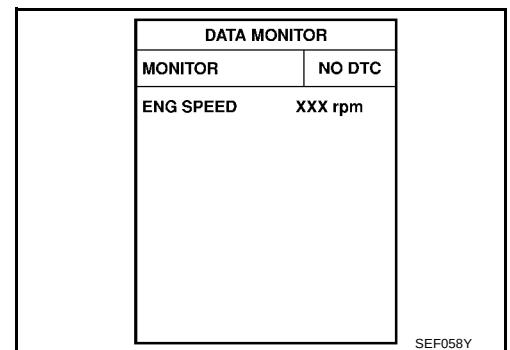
EBS000NV

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-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to [EC-589, "Diagnostic Procedure"](#).



ⓧ WITHOUT CONSULT-II

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 four times.
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 1st trip DTC is detected, go to [EC-589, "Diagnostic Procedure"](#).

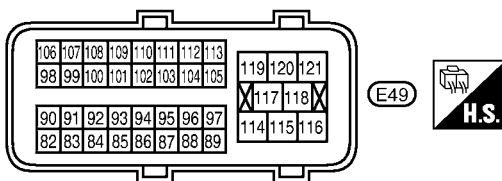
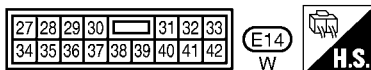
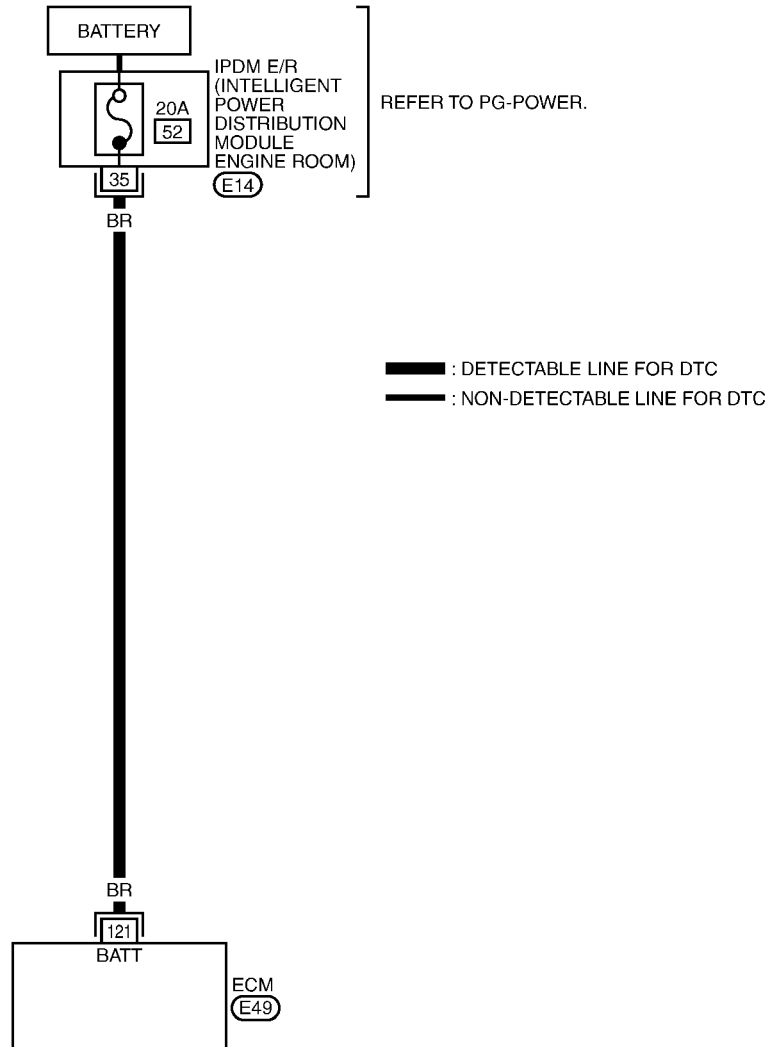
DTC P1065 ECM POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000NW

EC-ECM/PW-01



MBWA0285E

DTC P1065 ECM POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	BR	Power supply for ECM (Buck-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000NX

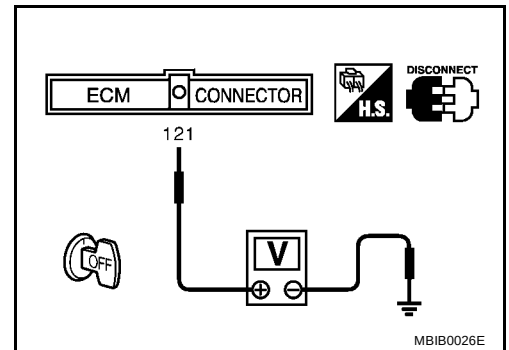
1. CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II 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 E14
- Harness for open or short between ECM and IPDM E/R

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
See [EC-587](#) .
5. Is the 1st trip DTC P1065 displayed again?

Without CONSULT-II

1. Turn ignition switch "ON".
2. Erase the "Diagnostic Test Mode II (Self-diagnostic results)" memory. Refer to [EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .
3. **Perform "DTC Confirmation Procedure".**
See [EC-587](#) .
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 [EC-443, "NATS \(Nissan Anti-theft System\)"](#) .
3. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
4. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

[CR (WITHOUT EURO-OBD)]

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

EBS000NY

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

EBS000NZ

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. This self-diagnosis has the one trip detection logic.	

FAIL-SAFE MODE

When the malfunction A or B is detected in the two consecutive trips, the ECM enters fail-safe mode and the MIL lights up.

When the malfunction C is detected even in the 1st trip, 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, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

EBS000O0

NOTE:

- Perform "PROCEDURE FOR MALFUNCTION A AND B" first. If the 1st trip 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-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.
4. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
5. If 1st trip DTC is detected, go to [EC-592, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Without CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

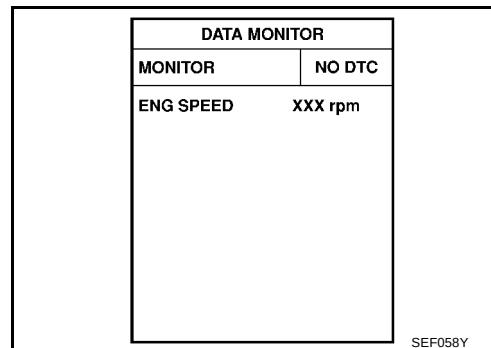
[CR (WITHOUT EURO-OBD)]

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-592, "Diagnostic Procedure"](#).

PROCEDURE FOR MALFUNCTION C

④ With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.
4. Shift selector lever to "N" or "P" 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-592, "Diagnostic Procedure"](#).



⊗ Without CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Shift selector lever to "D" position (A/T), "1st" position (M/T) and wait at least 2 seconds.
3. Shift selector lever to "N" or "P" position.
4. Start engine and let it idle for the 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-592, "Diagnostic Procedure"](#).

Diagnostic Procedure

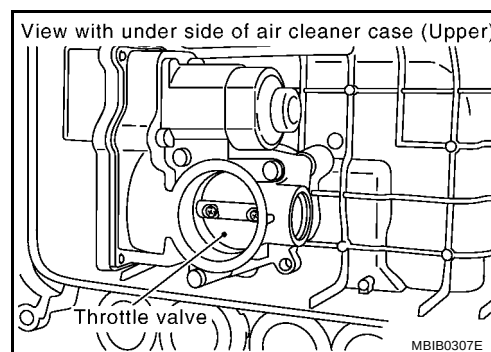
EBS00001

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 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-435, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-435, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITHOUT EURO-OBD)]

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

EBS00002

NOTE:

If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to [EC-591](#) or [EC-599](#).

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

EBS00003

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 problem	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, the ECM enters fail-safe mode and the MI 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

EBS00004

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-II

1. Turn ignition switch "ON" and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-595, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ WITHOUT CONSULT-II

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-595, "Diagnostic Procedure"](#).

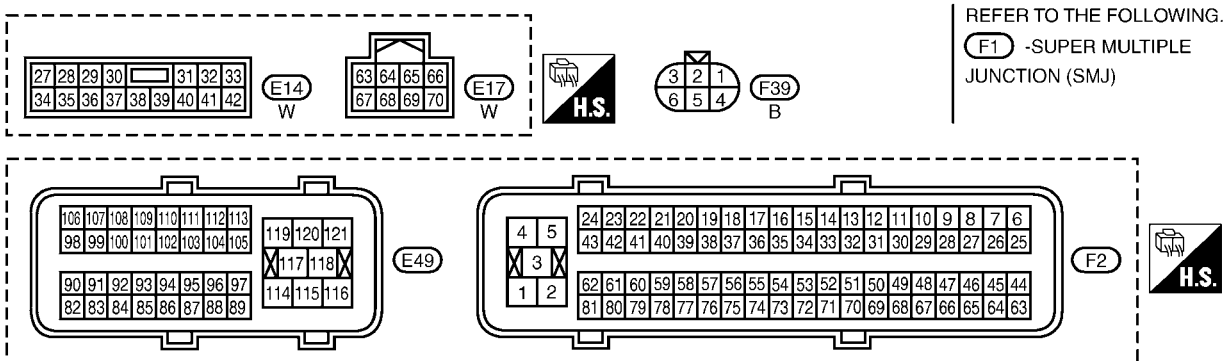
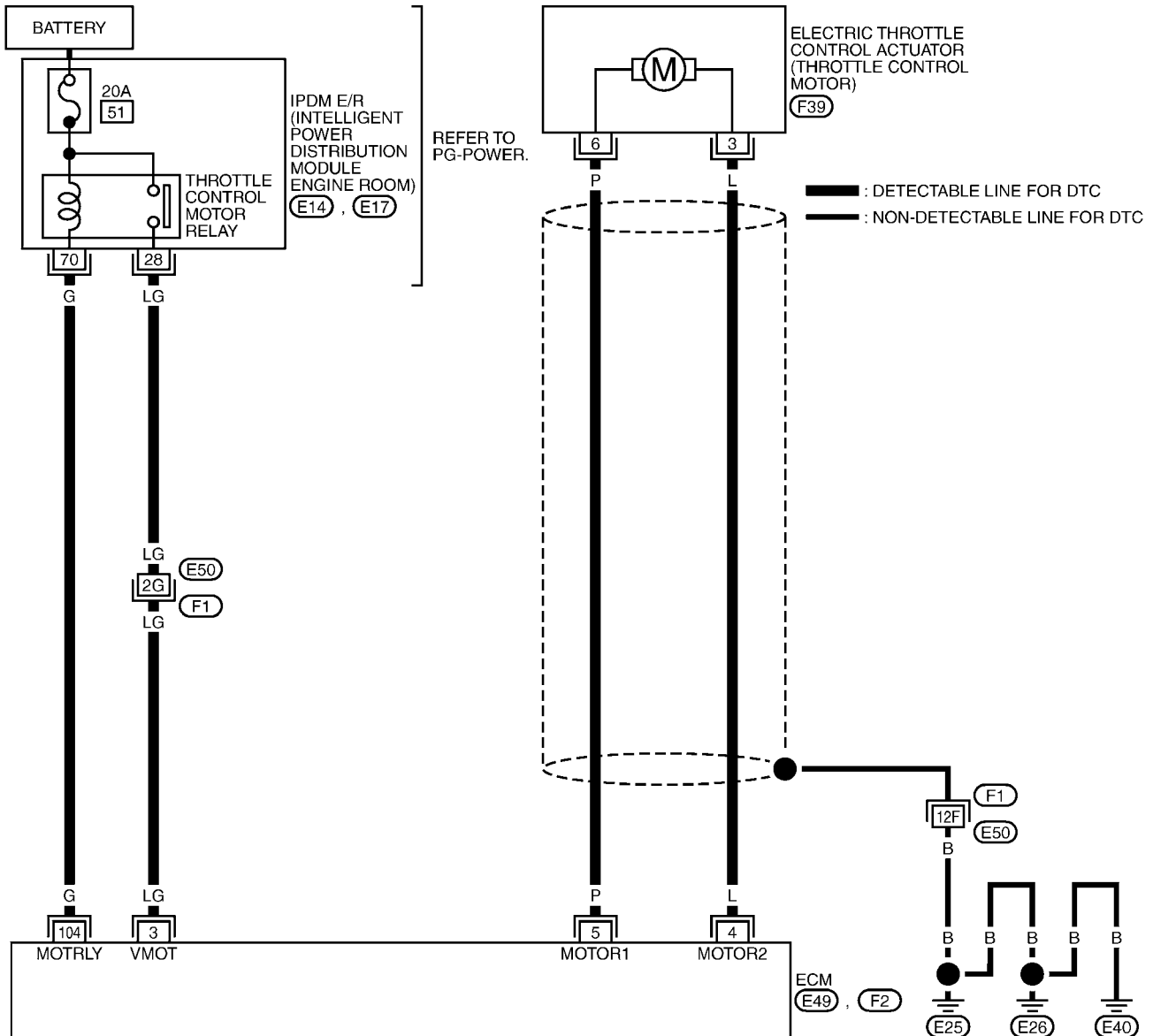
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS00005

EC-ETC1-01



MBWA0286E

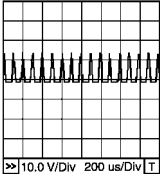
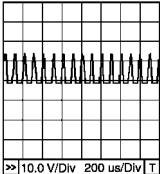
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
4	L	Throttle control motor (Close)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	P	Throttle control motor (Open)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
104	G	Throttle control motor relay	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

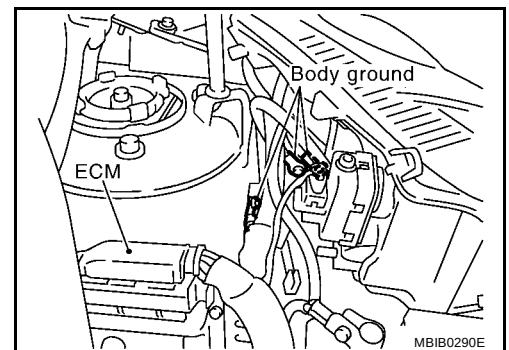
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITHOUT EURO-OBID)]

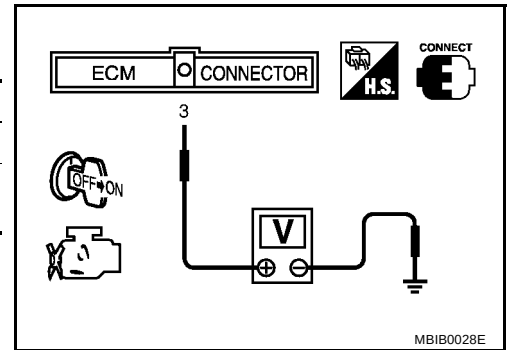
2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 10.
NG >> GO TO 3.



3. 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 E14.
4. Check harness continuity between ECM terminal 3 and IPDM E/R terminal 28. 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 E50, F1
- IPDM E/R harness connector E14
- 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.

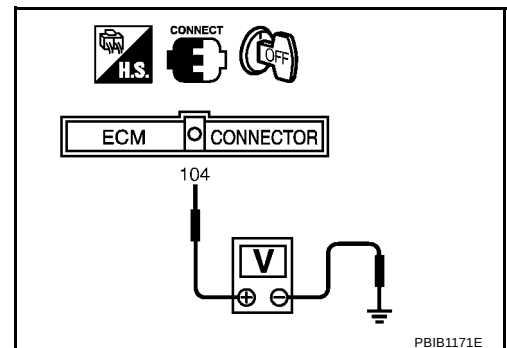
5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "OFF".
3. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 9.
NG >> GO TO 6.



DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

[CR (WITHOUT EURO-OBD)]

6. 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 70.
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.

7. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E17
- 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 FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 9.
NG >> Replace 20A fuse.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

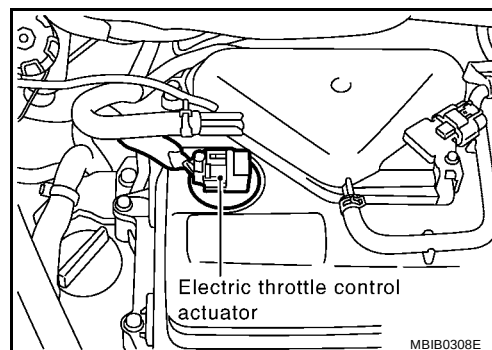
1. Turn ignition switch "OFF".
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
3	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 11.
NG >> Repair or replace.



DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION [CR (WITHOUT EURO-OBD)]

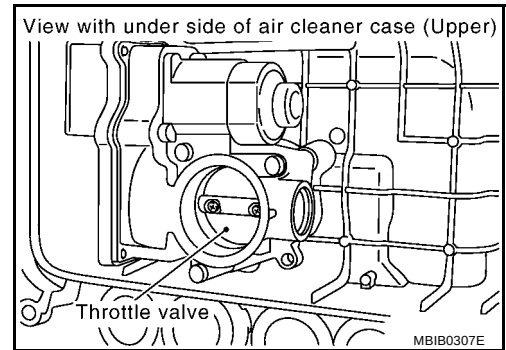
11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 12.

NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-598, "Component Inspection"](#).

OK or NG

OK >> GO TO 13.

NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

OK or NG

OK >> GO TO 14.

NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-435, "Idle Air Volume Learning"](#).

>> INSPECTION END

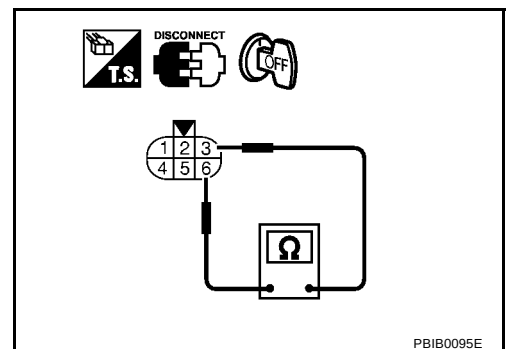
Component Inspection THROTTLE CONTROL MOTOR

EBS00007

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 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-435, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-435, "Idle Air Volume Learning"](#).



Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS00008

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#).

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITHOUT EURO-OB)]

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

EBS00009

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-II Reference Value in Data Monitor Mode

EBS0000A

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

EBS0000B

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, the ECM enters fail-safe mode and the MI 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

EBS0000C

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 10V at idle.

With CONSULT-II

1. Turn ignition switch "ON" and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-602, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

[CR (WITHOUT EURO-OBD)]

⊗ Without CONSULT-II

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. If DTC is detected, go to [EC-602, "Diagnostic Procedure"](#) .

PROCEDURE FOR DTC P1126

Ⓟ With CONSULT-II

1. Turn ignition switch "ON" and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-602, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

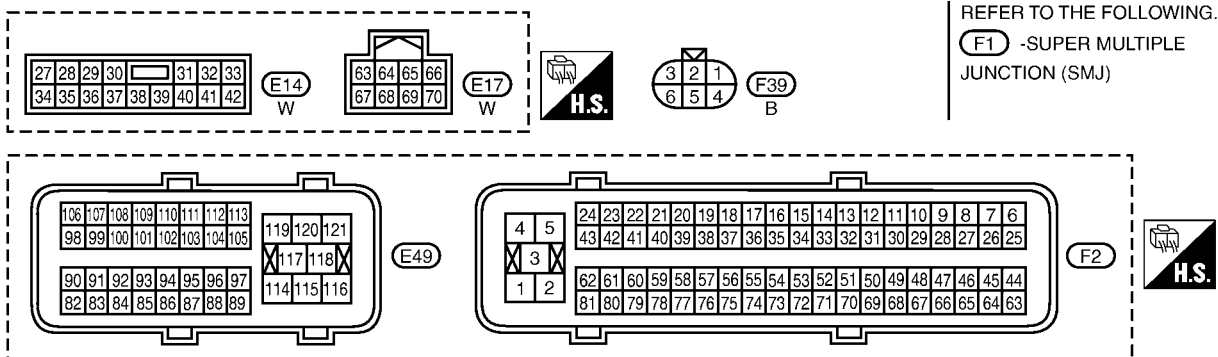
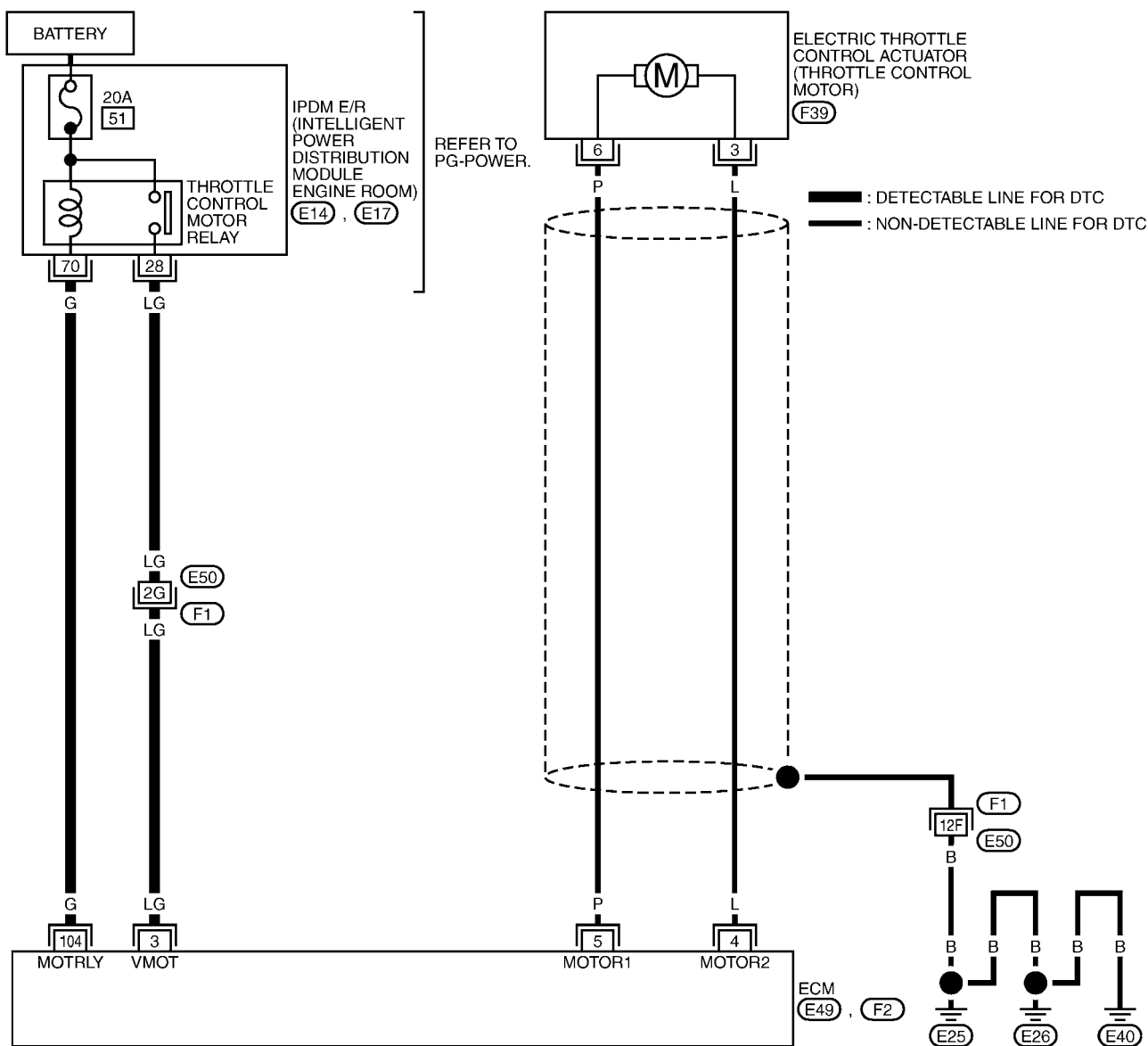
⊗ Without CONSULT-II

1. Turn ignition switch "ON" and wait at least 2 second.
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-602, "Diagnostic Procedure"](#) .

Wiring Diagram

EBS00OOD

EC-ETC2-01



MBWA0287E

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	LG	Throttle control motor relay power supply	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
104	G	Throttle control motor relay	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

Diagnostic Procedure

EBS0000E

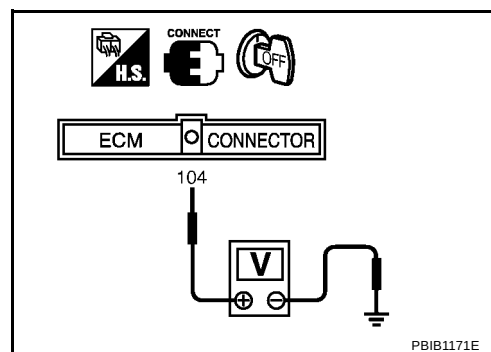
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF".
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage.

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.



2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL 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 70.

Continuity should exist.

4. 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.

- IPDM E/R harness connector E17
- Harness for open or short between ECM and IPDM E/R

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

4. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

- OK >> GO TO 8.
NG >> Replace 20A fuse.

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY [CR (WITHOUT EURO-OBD)]

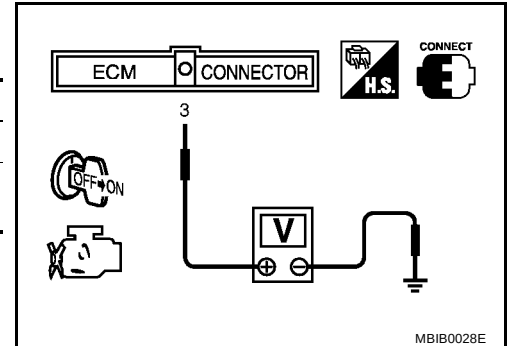
5. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT-I

1. Reconnect all disconnected connectors.
2. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6. 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 E14.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 28.
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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- 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-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITHOUT EURO-OBDD)]

DTC P1128 THROTTLE CONTROL MOTOR

PDF:16119

Component Description

EBS000OF

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

EBS000OG

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 MI 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

EBS000OH

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-II

1. Turn ignition switch "ON" and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-606, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITHOUT CONSULT-II

1. Turn ignition switch "ON" and wait at least 2 second.
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-606, "Diagnostic Procedure"](#).

DTC P1128 THROTTLE CONTROL MOTOR
[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000001

EC-ETC3-01

A

EC

C

D

E

F

G

H

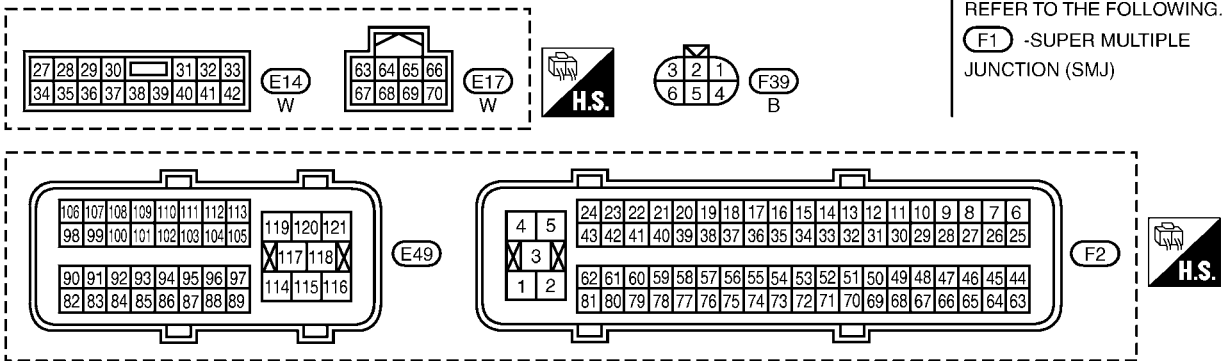
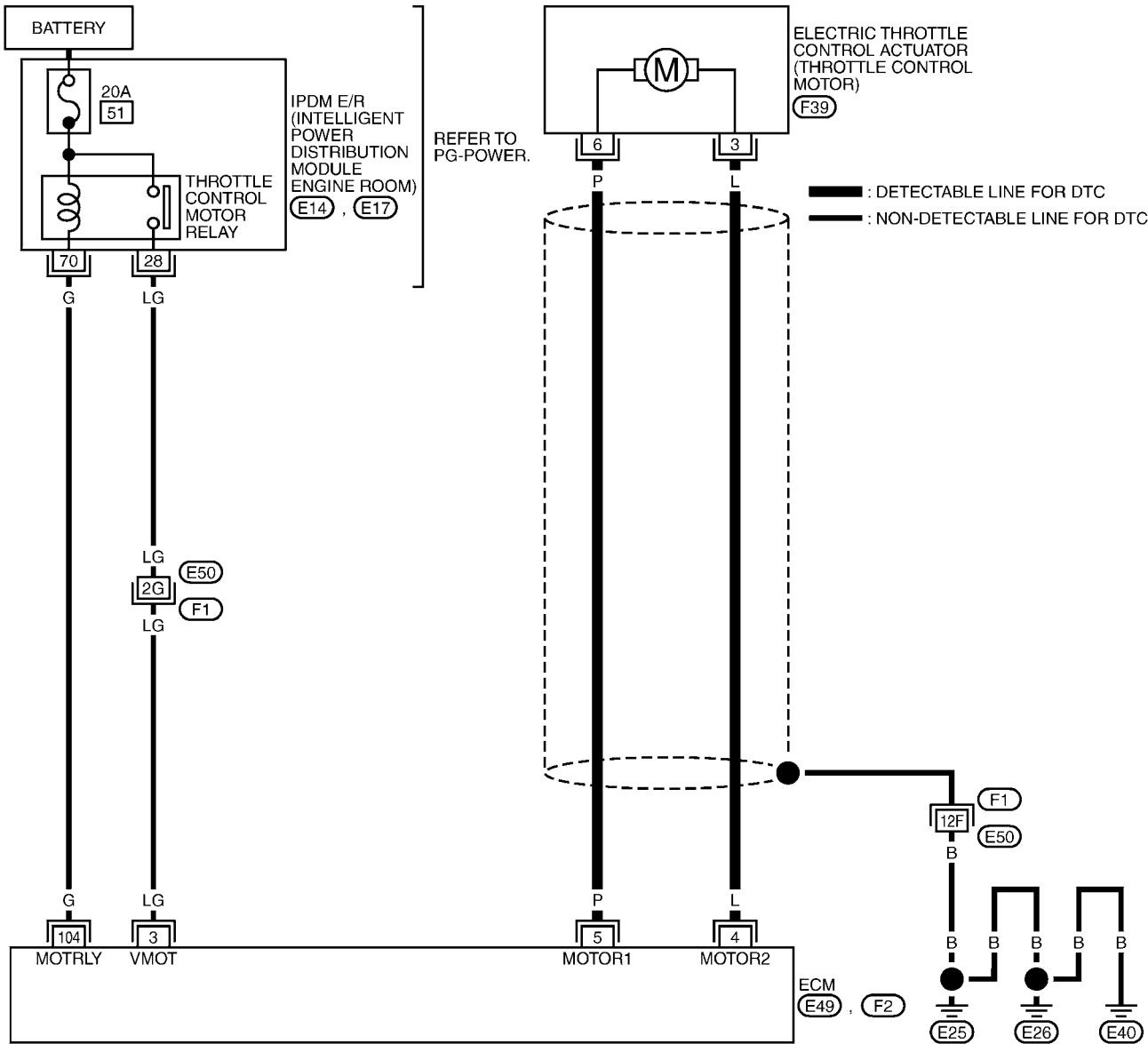
I

J

K

L

M



MBWA0288E

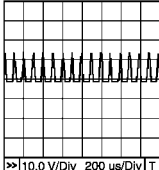
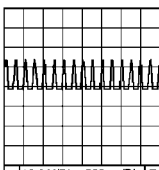
DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITHOUT EURO-OBID)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L	Throttle control motor (Close)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	P	Throttle control motor (Open)	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

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

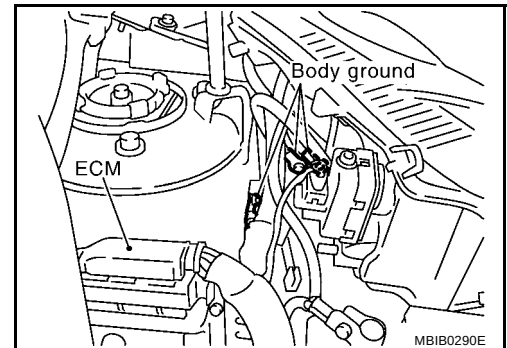
Diagnostic Procedure

EBS0000J

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



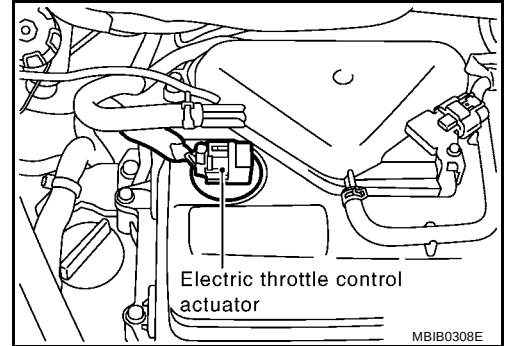
DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITHOUT EURO-OBD)]

2. 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
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist



5. 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-607, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

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-435, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-435, "Idle Air Volume Learning"](#).

>> INSPECTION END

Component Inspection

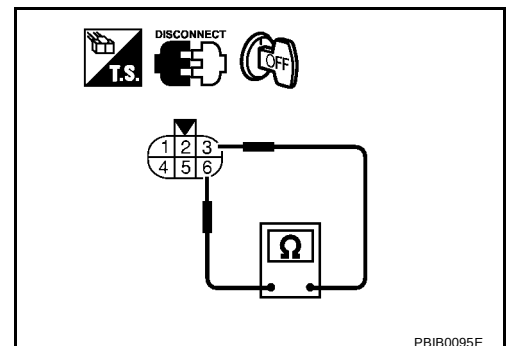
THROTTLE CONTROL MOTOR

EBS000OK

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 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-435, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-435, "Idle Air Volume Learning"](#).



DTC P1128 THROTTLE CONTROL MOTOR

[CR (WITHOUT EURO-OBD)]

Remove and Installation

EBS00000L

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1171 INTAKE ERROR

[CR (WITHOUT EURO-OBD)]

DTC P1171 INTAKE ERROR

PPF:22365

On Board Diagnosis Logic

EBS000SS

NOTE:

If DTC 1171 is displayed with DTC P0108, first perform the trouble diagnosis for DTC P0108.

Refer to [EC-510](#)

ECM computes two intake air volume values.

1: Computed from manifold absolute pressure signal and intake air temperature signal.

2: Computed from engine revolution signal and throttle position signal.

In normal condition, value 1 is used for engine control.

If intake air leak occurred between throttle valve and intake air port, manifold absolute pressure sensor signal might increase, and then ECM increases amount of fuel injected. In this case, ECM uses value 2 for engine control instead of value1.

ECM monitors the difference between value 1 and value 2. If the difference is extremely large, ECM judges intake air leak occurs and light up the MI

This diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1171 1171	Intake error	An excessively high voltage from manifold absolute pressure sensor is sent to ECM.	● Harness or connectors (The manifold absolute pressure sensor circuit is open or shorted.) ● Manifold absolute pressure ● Intake air leaks ● Vacuum hoses

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Intake air system problem	When accelerator pedal is depressed, engine speed will not rise more than 2,500 rpm due to fuel cut.

DTC Confirmation Procedure

EBS000ST

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to [EC-611, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

ⓧ WITHOUT CONSULT-II

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 trip DTC is detected, go to [EC-611, "Diagnostic Procedure"](#) .

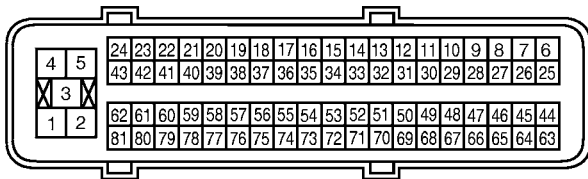
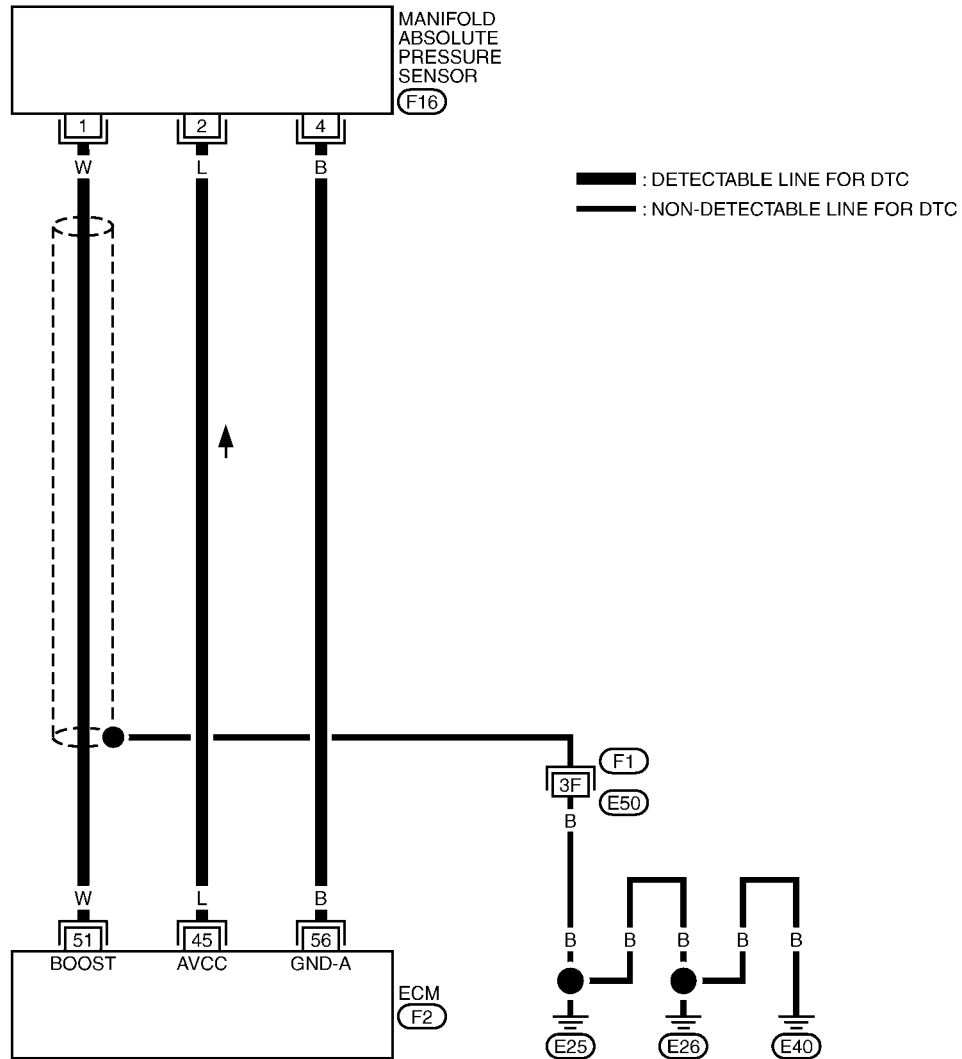
DTC P1171 INTAKE ERROR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000SU

EC-AP/SEN-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1171 INTAKE ERROR

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Manifold absolute pressure sensor	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 1.5V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 1.2V

Diagnostic Procedure

EBS000SV

1. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the air cleaner element.

OK or NG

OK >> GO TO 2.

NG >> Repair or replace.

2. CHECK VACUUM HOSE

1. Check intake manifold vacuum hoses for clogging or disconnection. Refer to [EC-423, "Vacuum Hose Drawing"](#).

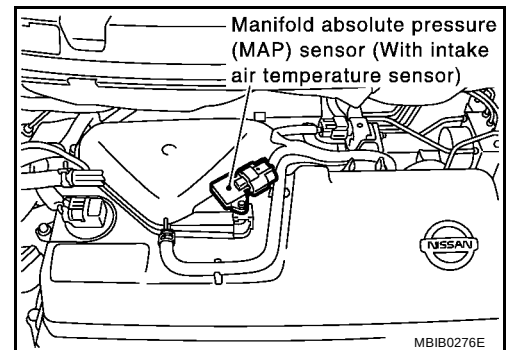
OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect manifold absolute pressure sensor harness connector.
3. Turn ignition switch "ON".



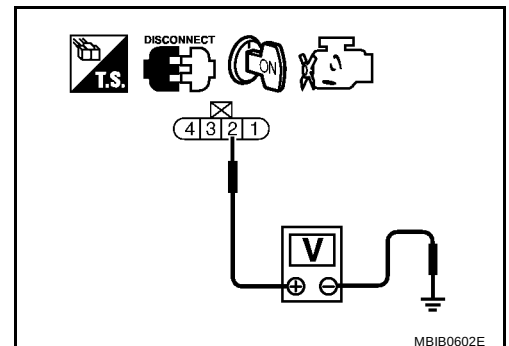
4. Check voltage between manifold absolute pressure sensor terminal 2 and ground.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.

NG >> Repair harness or connectors.



DTC P1171 INTAKE ERROR

[CR (WITHOUT EURO-OBD)]

4. CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between manifold absolute pressure sensor terminal 4 and ECM terminal 56.
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 harness or connectors.

5. CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between manifold absolute pressure sensor terminal 1 and ECM terminal 51.

Continuity should exist.

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

OK or NG

- OK >> GO TO 6.
NG >> Repair harness or connectors.

6. CHECK MAP SENSOR

Refer to [EC-511, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 7.
NG >> Repair or replace sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

DTC P1217 ENGINE OVER TEMPERATURE

PF0:00000

System Description

EBS00O0M

NOTE:

If DTC P1217 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-505, "DTC U1000, U1001 CAN COMMUNICATION LINE"](#).

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 relay)
Battery	Battery voltage*1		
Vehicle speed signal	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch*3	Air conditioner "ON" signal*2		
Refrigerant pressure sensor*3	Refrigerant pressure		

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

*2: These signals are sent to ECM through CAN communication line.

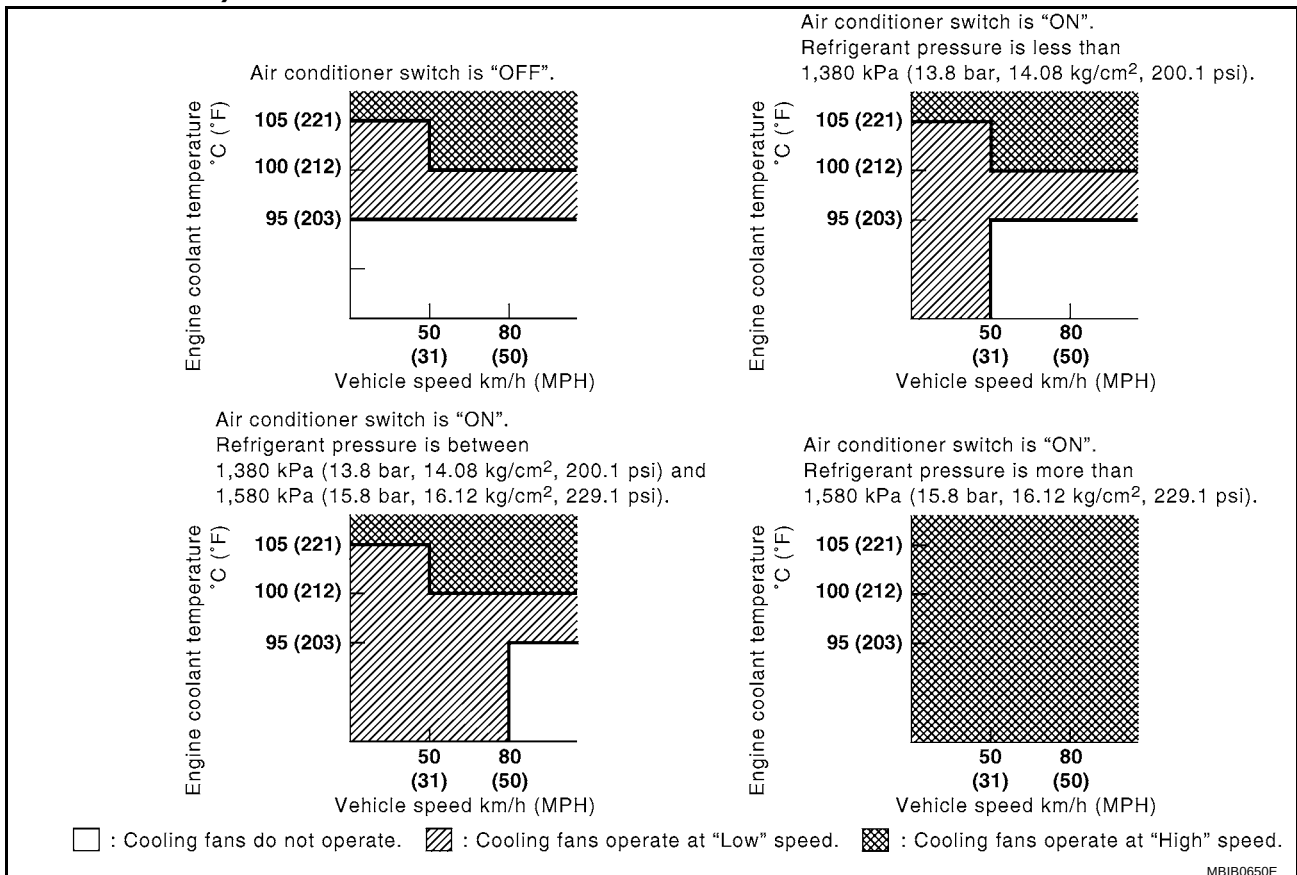
*3: Models with air conditioner.

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] (models with A/C) or 2 step control [ON/OFF] (models without A/T).

The ECM controls cooling fan relays through CAN communication line.

OPERATION

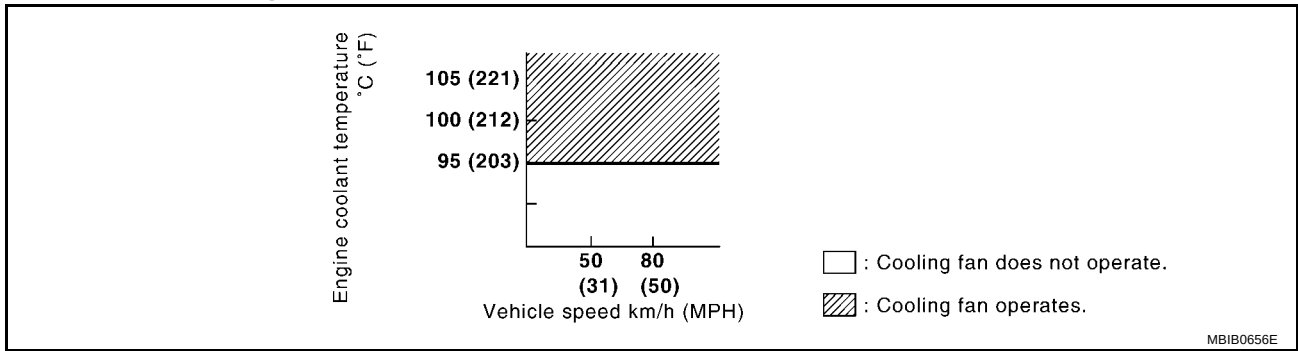
(Models with A/C)



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

(Models without A/C)



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

CONSULT-II Reference Value in Data Monitor Mode

EBS0000N

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	(Models with A/C) - Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (210°F)	LOW*
		Engine coolant temperature is 105°C (212°F) or more	HI*

*:Models without air conditioner, cooling fan operates only ON and OFF operation, but CONSULT-II display will change OFF, LOW and HI depends on engine coolant temperature.

On Board Diagnosis Logic

EBS00000

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 was not added to the system using the proper filling method.	- Harness or connectors (The cooling fan circuit is open or shorted.) - Cooling fan - Radiator hose - Radiator - Radiator cap - Water pump - Thermostat For more information, refer to EC-627, "Main 12 Causes of Overheating".

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-7, "Changing Engine coolant"](#). Also, replace the engine oil. Refer to [LU-5, "Changing Engine Oil"](#).

1. 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-13, "Engine Coolant Mixture Ratio"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

EBS0000P

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

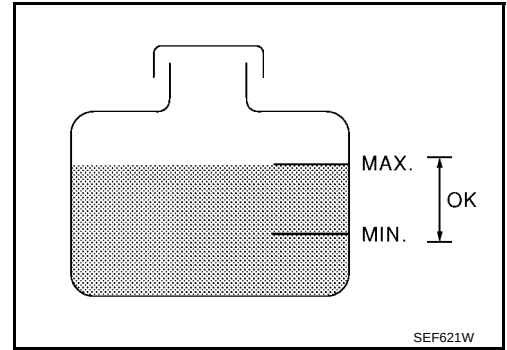
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

WITH CONSULT-II

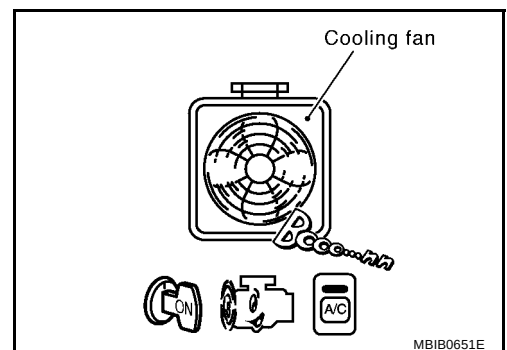
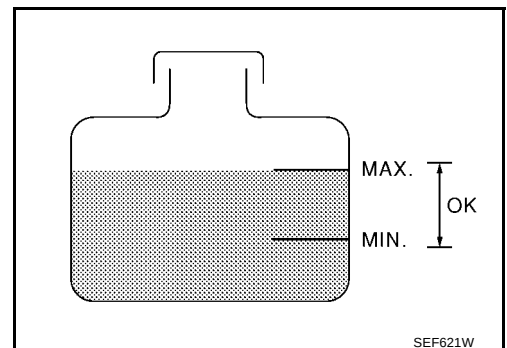
1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-620, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-620, "Diagnostic Procedure"](#).
3. Turn ignition switch "ON".
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
5. If the results are NG, go to [EC-620, "Diagnostic Procedure"](#).



ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLANT TEMP/S	XXX °C

WITHOUT CONSULT-II (Models with air conditioner)

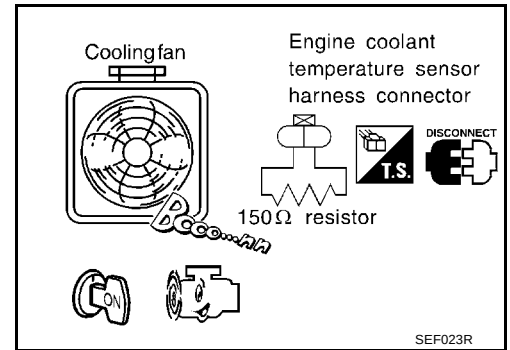
1. Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-620, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-620, "Diagnostic Procedure"](#).
3. Start engine.
Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch "ON".
6. Turn blower fan switch "ON".
7. Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
If NG, go to [EC-620, "Diagnostic Procedure"](#).
If OK, go to the following step.
9. Turn ignition switch "OFF".
10. Turn air conditioner switch and blower fan switch "OFF".
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



DTC P1217 ENGINE OVER TEMPERATURE

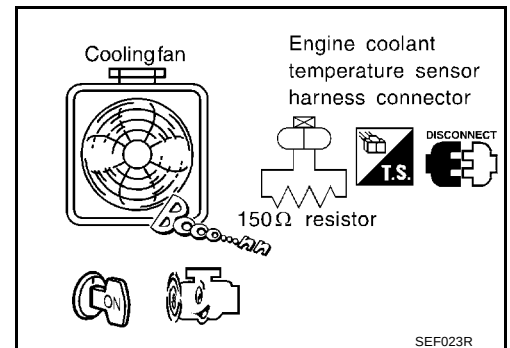
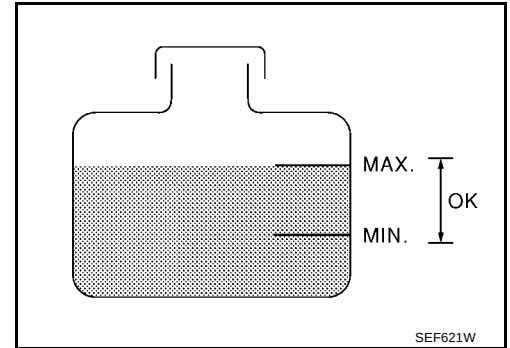
[CR (WITHOUT EURO-OBD)]

13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14. If NG, go to [EC-620, "Diagnostic Procedure"](#).



(Models without air conditioner)

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-620, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-620, "Diagnostic Procedure"](#).
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Start engine and make that cooling fan operates. Be careful not to overheat engine.
6. If NG, go to [EC-620, "Diagnostic Procedure"](#).



DTC P1217 ENGINE OVER TEMPERATURE

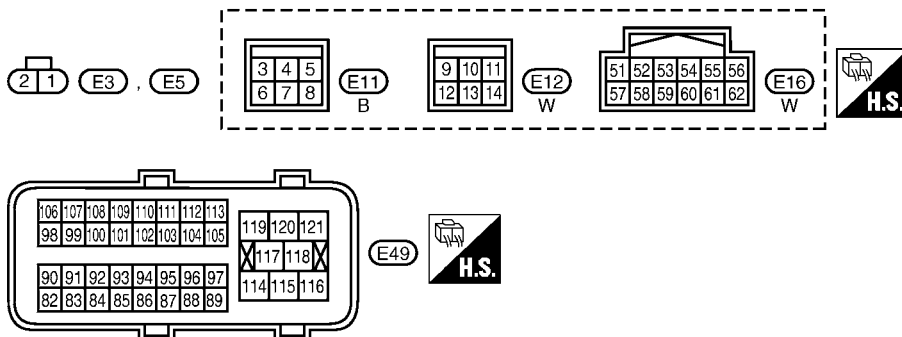
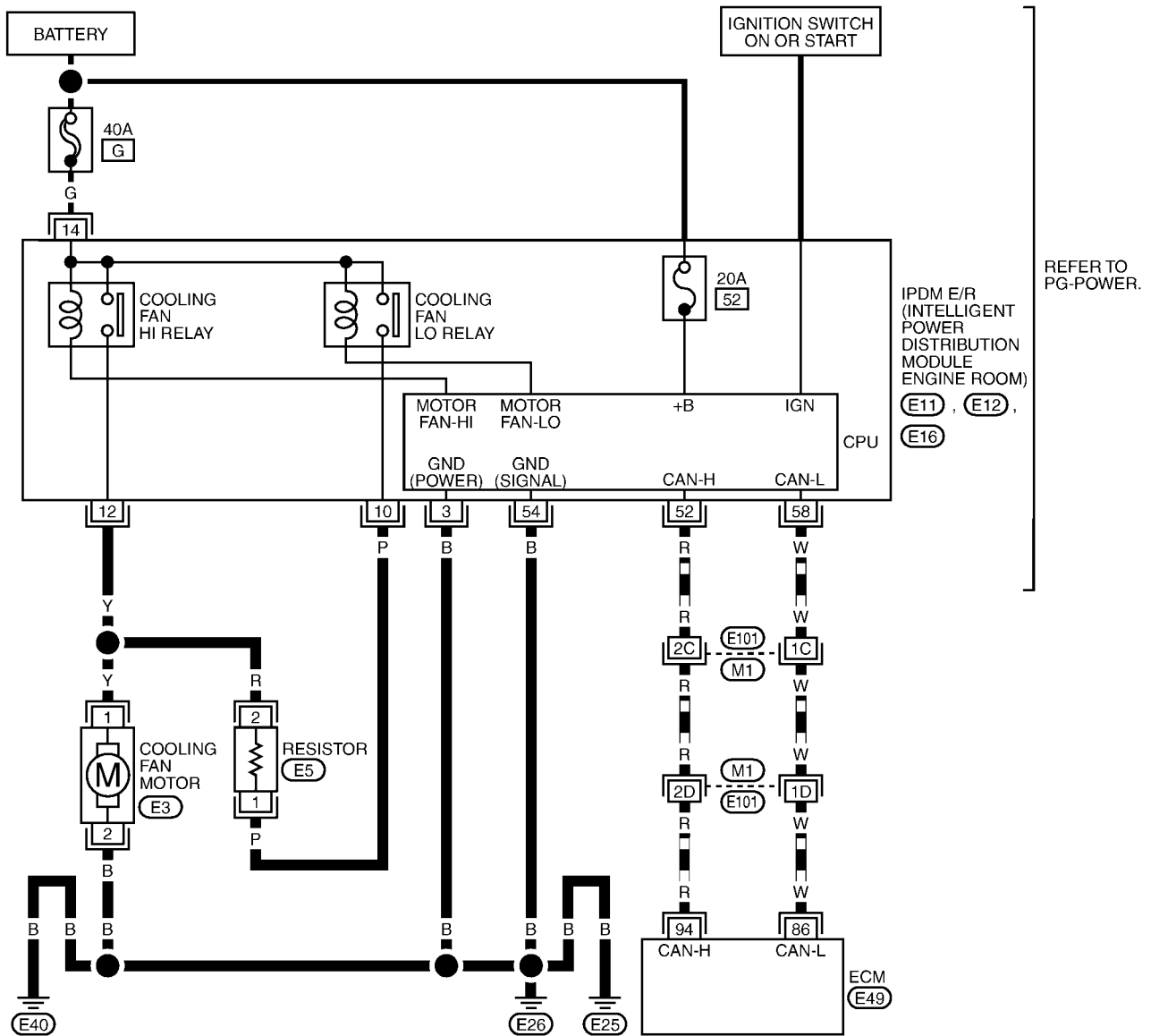
[CR (WITHOUT EURO-OBD)]

Wiring Diagram WITH AIR CONDITIONER

EBS0000Q

EC-COOL/F-01

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



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0289E

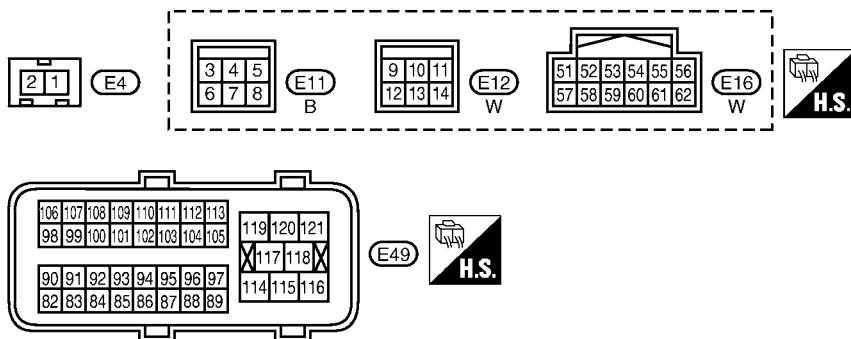
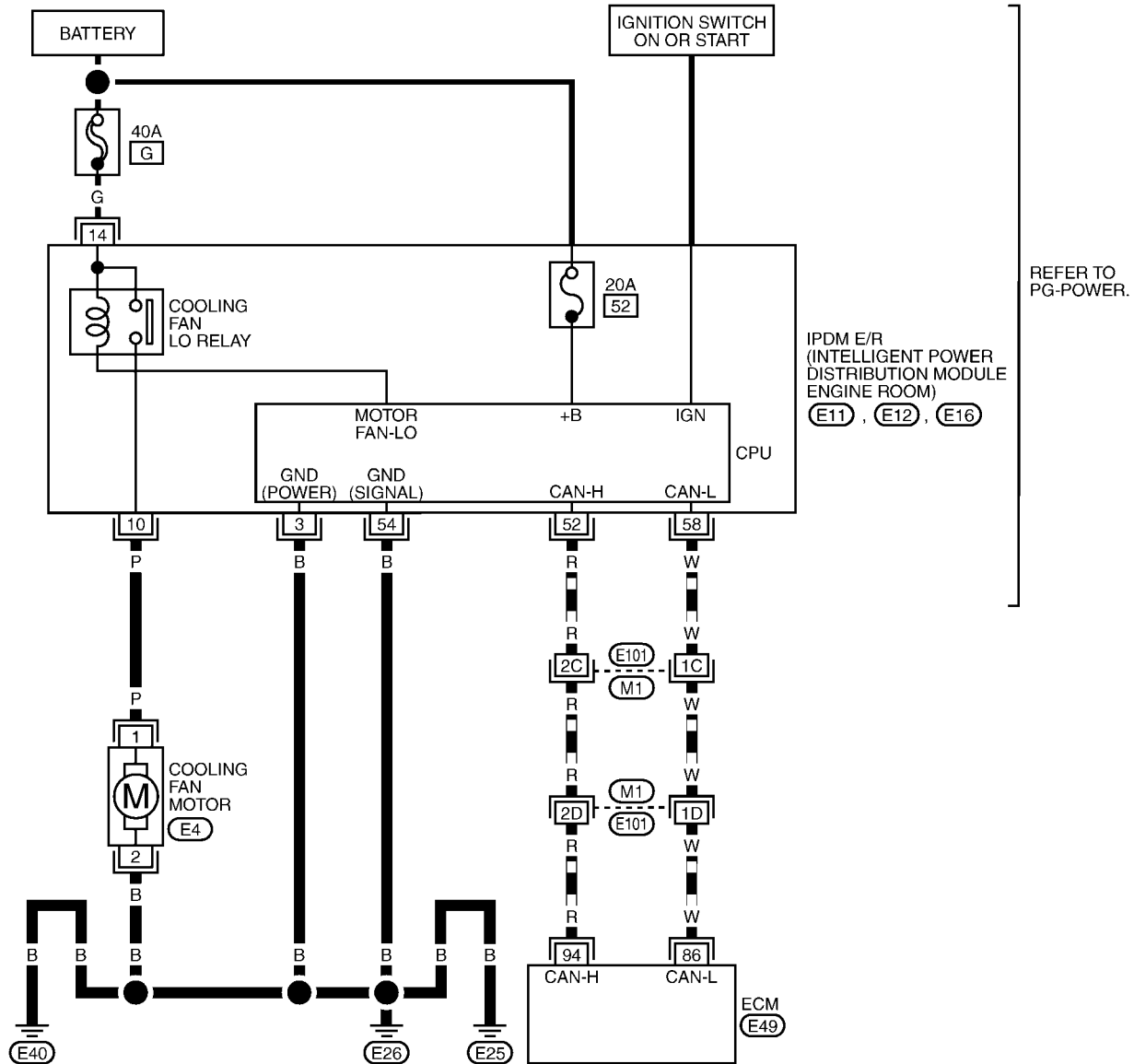
DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

WITHOUT AIR CONDITIONER

EC-COOL/F-02

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



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

EBS000OR

Diagnostic Procedure

PROCEDURE FOR MODELS WITH AIR CONDITIONER

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 4.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and touch "LOW" on the CONSULT-II screen.
3. Make sure that cooling fan operates at low speed.

OK or NG

OK >> GO TO 3.

NG >> Check cooling fan low speed control circuit. (Go to [EC-625, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLANT TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch "HIGH" on the CONSULT-II screen.
2. Make sure that cooling fan operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to [EC-625, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLANT TEMP/S	XXX °C

SEF785Z

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

4. CHECK COOLING FAN LOW SPEED OPERATION

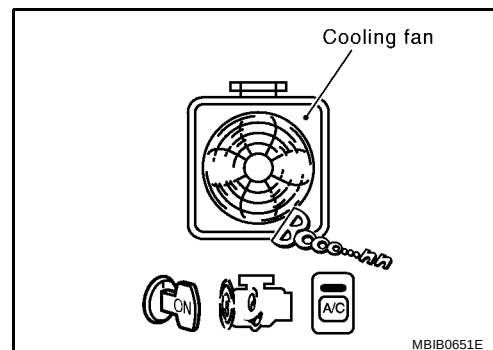
⊗ Without CONSULT-II

1. Start engine and let it idle.
2. Turn air conditioner switch "ON".
3. Turn blower fan switch "ON".
4. Make sure that cooling fan operates at low speed.

OK or NG

OK >> GO TO 5.

NG >> Check cooling fan low speed control circuit. (Go to [EC-625, "PROCEDURE A"](#).)



5. CHECK COOLING FAN HIGH SPEED OPERATION

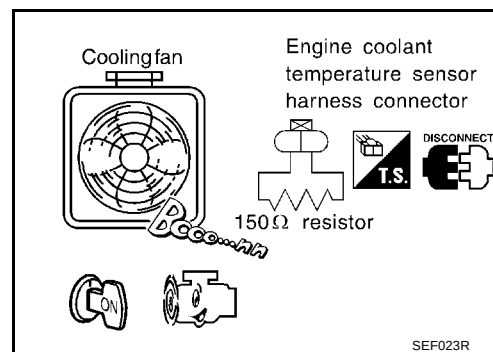
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Turn air conditioner switch and blower fan switch "OFF".
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to [EC-625, "PROCEDURE A"](#).)



6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm², 23psi)

CAUTION:

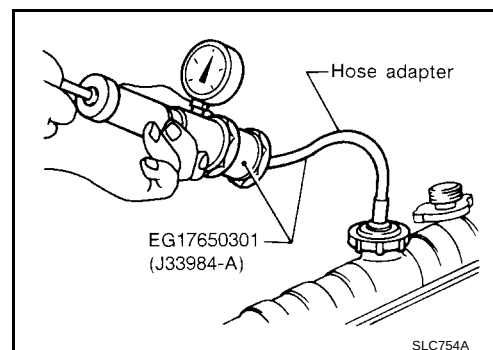
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to [CO-20, "WATER PUMP"](#) .)

>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

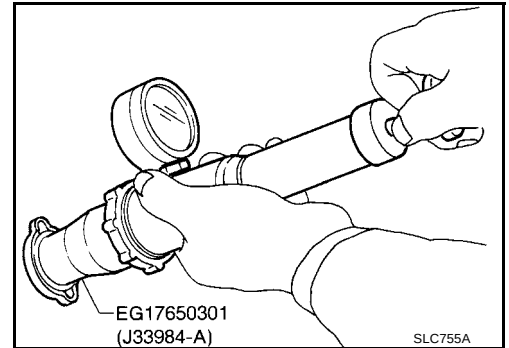
Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm² , 9 - 14 psi)

OK or NG

OK >> GO TO 9.

NG >> Replace radiator cap.



9. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

Valve lift:

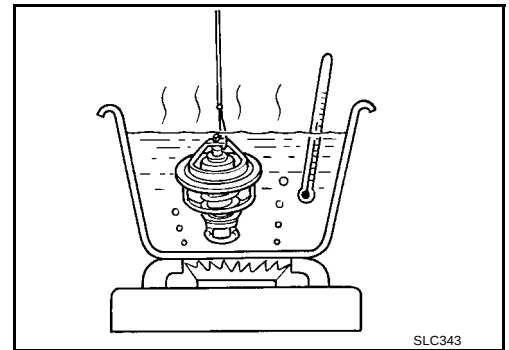
More than 8 mm/95 °C (0.31 in/203 °F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to [CO-22, "THERMOSTAT"](#) .

OK or NG

OK >> GO TO 10.

NG >> Replace thermostat.



10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-517, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-627, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

PROCEDURE FOR MODELS WITHOUT AIR CONDITIONER

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK COOLING FAN OPERATION

⑧ With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and touch "ON" on the CONSULT-II screen.
3. Make sure that cooling fan operates.

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan low speed control circuit. (Go to [EC-625, "PROCEDURE A"](#).)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLANT TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN OPERATION

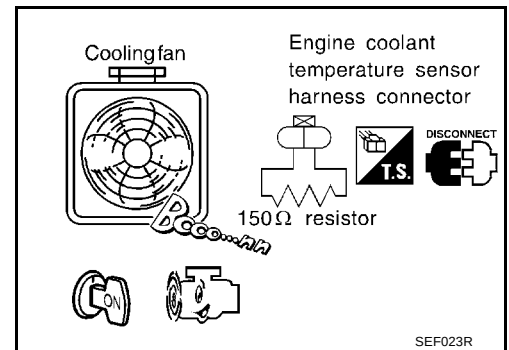
⑧ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Restart engine and make sure that cooling fan operates.

OK or NG

OK >> GO TO 4.

NG >> Check cooling fan high speed control circuit-1. (Go to [EC-625, "PROCEDURE A"](#).)



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm² , 23psi)

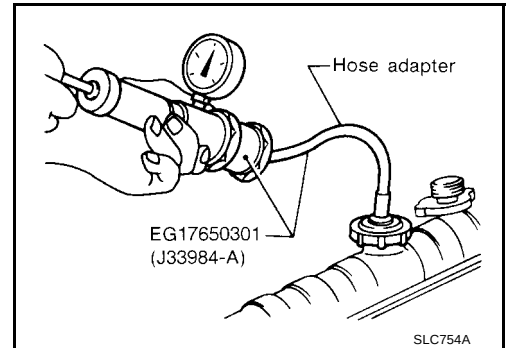
CAUTION:

Higher than the specified pressure may cause radiator damage.

Pressure should not drop.

OK or NG

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



5. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to [CO-20, "WATER PUMP"](#) .)

>> Repair or replace.

6. CHECK RADIATOR CAP

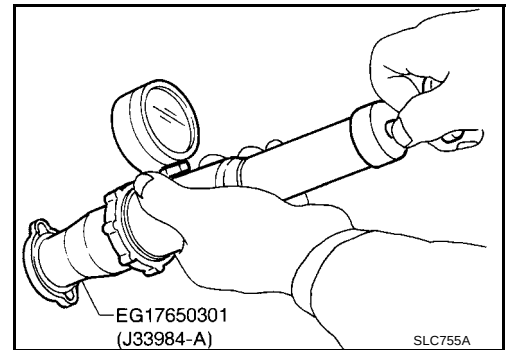
Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm² , 9 - 14 psi)

OK or NG

- OK >> GO TO 7.
- NG >> Replace radiator cap.



7. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

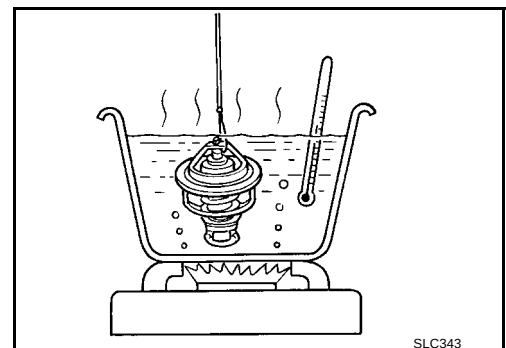
Valve lift:

More than 8 mm/95 °C (0.31 in/203 °F)

4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to [CO-22, "THERMOSTAT"](#) .

OK or NG

- OK >> GO TO 8.
- NG >> Replace thermostat.



DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

8. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-517, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 9.
NG >> Replace engine coolant temperature sensor.

9. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-627, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END

PROCEDURE A

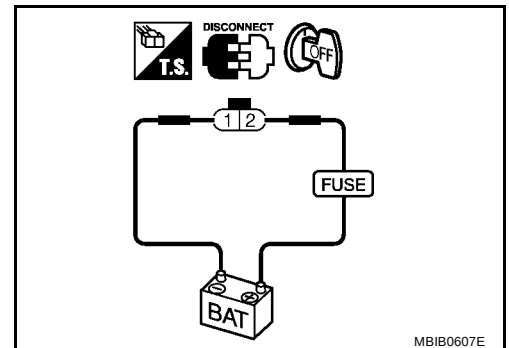
1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E12.
3. Check voltage between IPDM E/R terminal 14 and ground with CONSULT-II 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 links
- Harness for open or short between IPDM E/R and battery

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

3. CHECK COOLING FAN MOTORS CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between cooling fan motor terminal 1 and IPDM E/R terminal 12, cooling fan motor terminal 2 and ground.

Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.
4. For models with air conditioner, check harness continuity between IPDM E/R terminal 10, and cooling fan motor terminal 1.

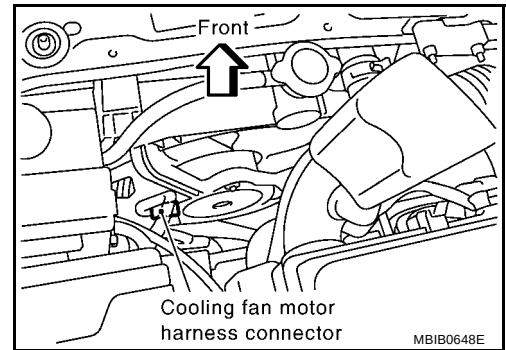
Refer to wiring diagram.

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 for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between resistor and IPDM E/R (models with A/T)
- Harness for open or short between resistor and cooling fan motor (models with A/T)
- Resistor E5 (models with A/C)

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

5. CHECK COOLING FAN MOTORS

Refer to [EC-627, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
NG >> Replace cooling fan motors.

6. CHECK INTERMITTENT INCIDENT

Perform [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-18, "IPDM E/R \(INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM\)"](#) .
NG >> Repair or replace harness or connector.

DTC P1217 ENGINE OVER TEMPERATURE

[CR (WITHOUT EURO-OBD)]

Main 12 Causes of Overheating

EBS000OS

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	See MA-13, "Engine Coolant Mixture Ratio" .
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-7, "LEVEL CHECK" .
	4	Radiator cap	Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See CO-14, "Checking Radiator Cap" .
ON*2	5	Coolant leaks	Visual	No leaks	See CO-7, "LEAK CHECK" .
ON*2	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-22, "THERMOSTAT" , and CO-10, "RADIATOR" .
ON*1	7	Cooling fan	CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-620) .
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	See CO-7, "Changing Engine coolant" .
OFF*4	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	See CO-7, "LEVEL CHECK" .
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-57, "CYLINDER HEAD" .
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	See EM-69, "CYLINDER BLOCK" .

*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.

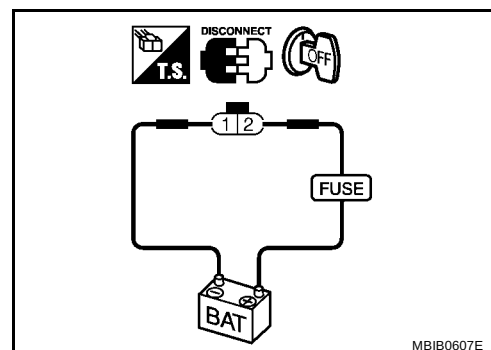
For more information, refer to [CO-4, "OVERHEATING CAUSE ANALYSIS"](#) .

Component Inspection

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2



DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

DTC P1223, P1224 TP SENSOR

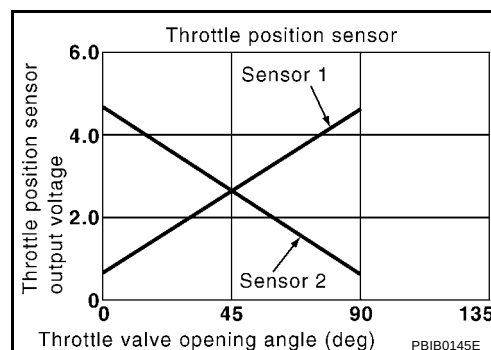
PFP:16119

Component Description

EBS000SG

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-II Reference Value in Data Monitor Mode

EBS000SH

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T model) 1st (M/T model)	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

EBS000SI

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1223 1223	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.) ● Electric throttle control actuator (TP sensor 2)
P1224 1224	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, the ECM enters fail-safe mode and the MI 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

EBS000SJ

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.

DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-631, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

WITHOUT CONSULT-II

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-631, "Diagnostic Procedure"](#) .

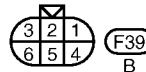
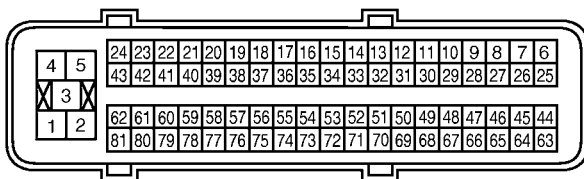
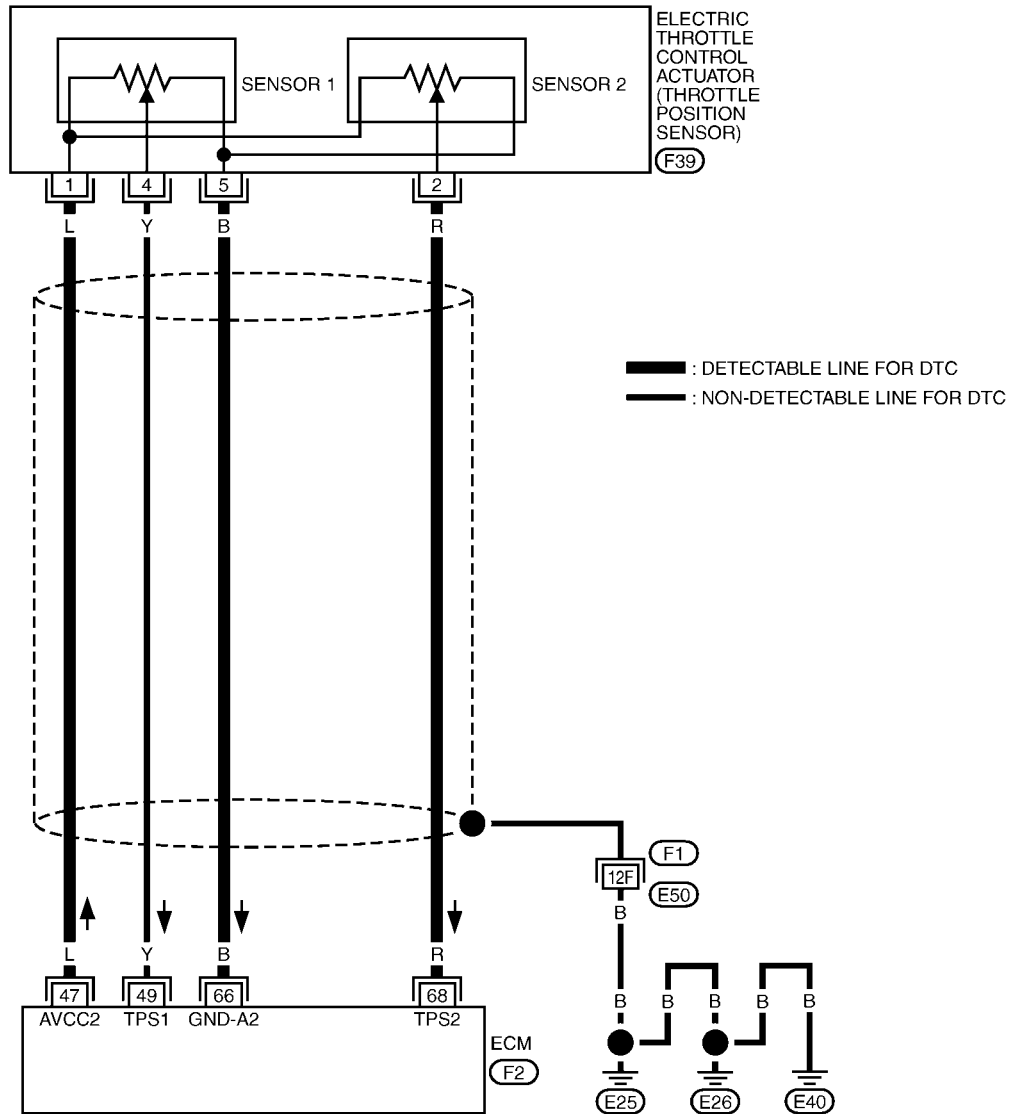
DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000SK

EC-TPS2-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0291E

DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensors' power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V
49	Y	Throttle position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensors' ground (Throttle position sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	More than 0.36V

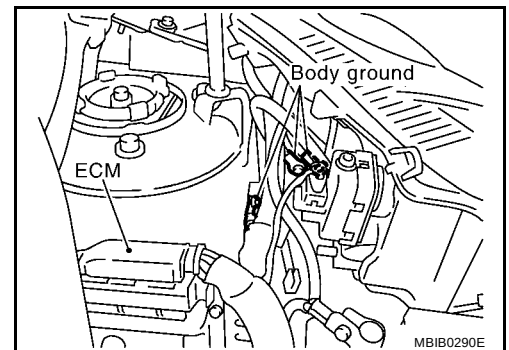
Diagnostic Procedure

EBS000SL

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

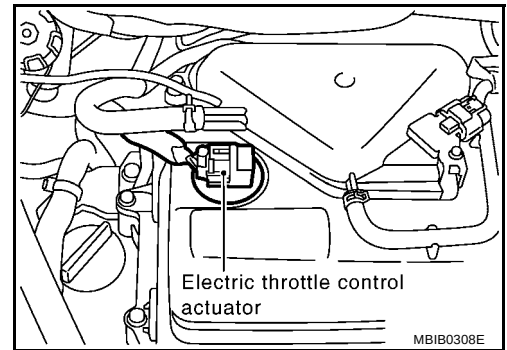


DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

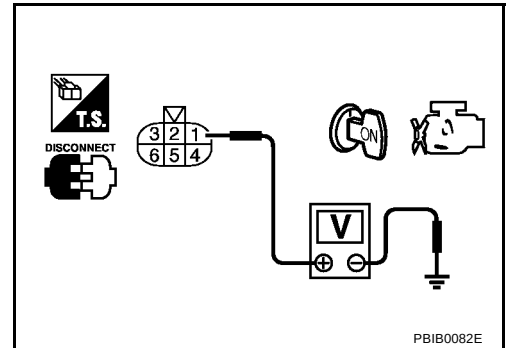


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

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 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 ECM terminal 66 and electric throttle control actuator terminal 5. 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 68 and electric throttle control actuator terminal 2. 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 THROTTLE POSITION SENSOR

Refer to [EC-633, "Component Inspection"](#).

OK or NG

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

DTC P1223, P1224 TP SENSOR

[CR (WITHOUT EURO-OBD)]

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection THROTTLE POSITION SENSOR

EBS000SM

1. Reconnect all harness connectors disconnected.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch "ON".
4. Set selector lever to "D" position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

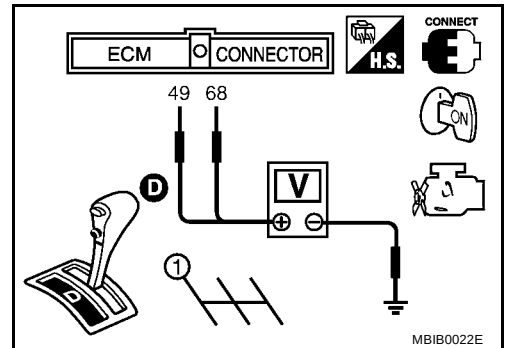
Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-435, "Idle Air Volume Learning"](#) .

Remove and Installation ELECTRIC THROTTLE CONTROL ACTUATOR

EBS000SN

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .



DTC P1225 TP SENSOR

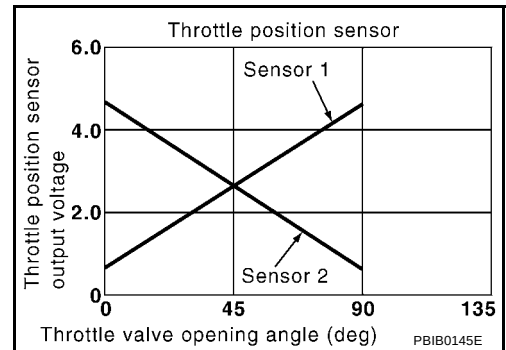
PFP:16119

Component Description

EBS000OU

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

EBS000OV

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

EBS000OW

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-II**

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds.
4. Turn ignition switch "ON".
5. If 1st trip DTC is detected, go to [EC-635, "Diagnostic Procedure"](#).

The screenshot shows the CONSULT-II interface. At the top is a box labeled 'DATA MONITOR'. Below it are two columns: 'MONITOR' and 'NO DTC'. Under 'MONITOR', it displays 'ENG SPEED'. Under 'NO DTC', it displays 'XXX rpm'. The background of the screen is dark with some faint grid lines. The label 'SEF058Y' is in the bottom right corner.

② **WITHOUT CONSULT-II**

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-635, "Diagnostic Procedure"](#).

Diagnostic Procedure

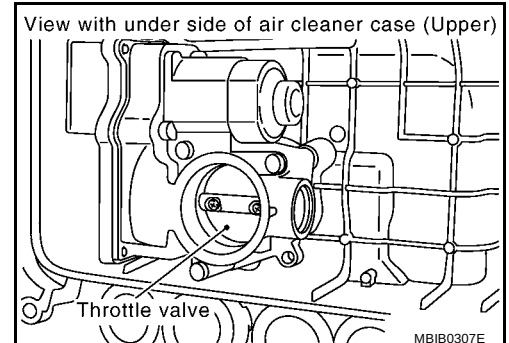
EBS0000X

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.

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-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

**Remove and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR**

EBS0000Y

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1226 TP SENSOR

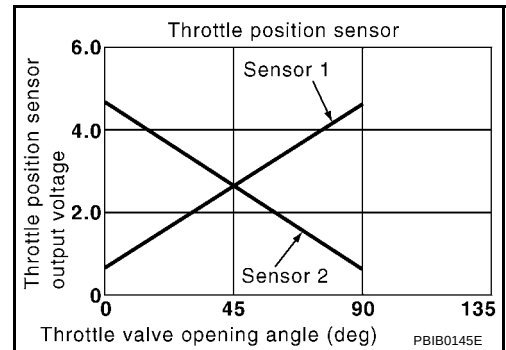
PFP:16119

Component Description

EBS000OZ

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

EBS000OP0

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

EBS000P1

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch "OFF", wait at least 10 seconds.
4. Turn ignition switch "ON".
5. Repeat steps 3 and 4, 32 times.
6. If 1st trip DTC is detected, go to [EC-637, "Diagnostic Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ WITHOUT CONSULT-II

1. Turn ignition switch "ON".
2. Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
3. Repeat step 2, 32 times.
4. Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5. If 1st trip DTC is detected, go to [EC-637, "Diagnostic Procedure"](#).

Diagnostic Procedure

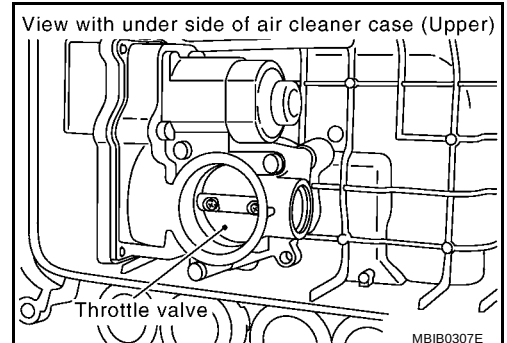
EBS000P2

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.

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-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

**Remove and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR**

EBS000P3

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

DTC P1227, P1228 APP SENSOR

PF18002

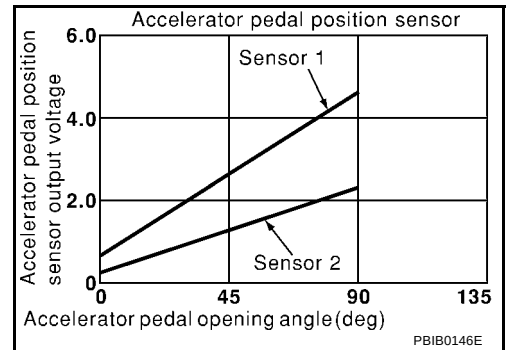
Component Description

EBS000P4

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-II Reference Value in Data Monitor Mode

EBS000P5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
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 signal.

On Board Diagnosis Logic

EBS000P6

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	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)
P1228 1228	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, the ECM enters fail-safe mode and the MI 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 throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

DTC Confirmation Procedure

EBS000P7

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.

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

④ WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-643, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

⊗ WITHOUT CONSULT-II

1. Start engine and let it idle for 1 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-643, "Diagnostic Procedure"](#) .

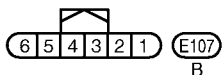
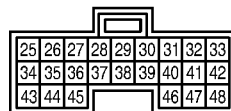
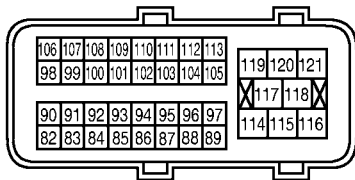
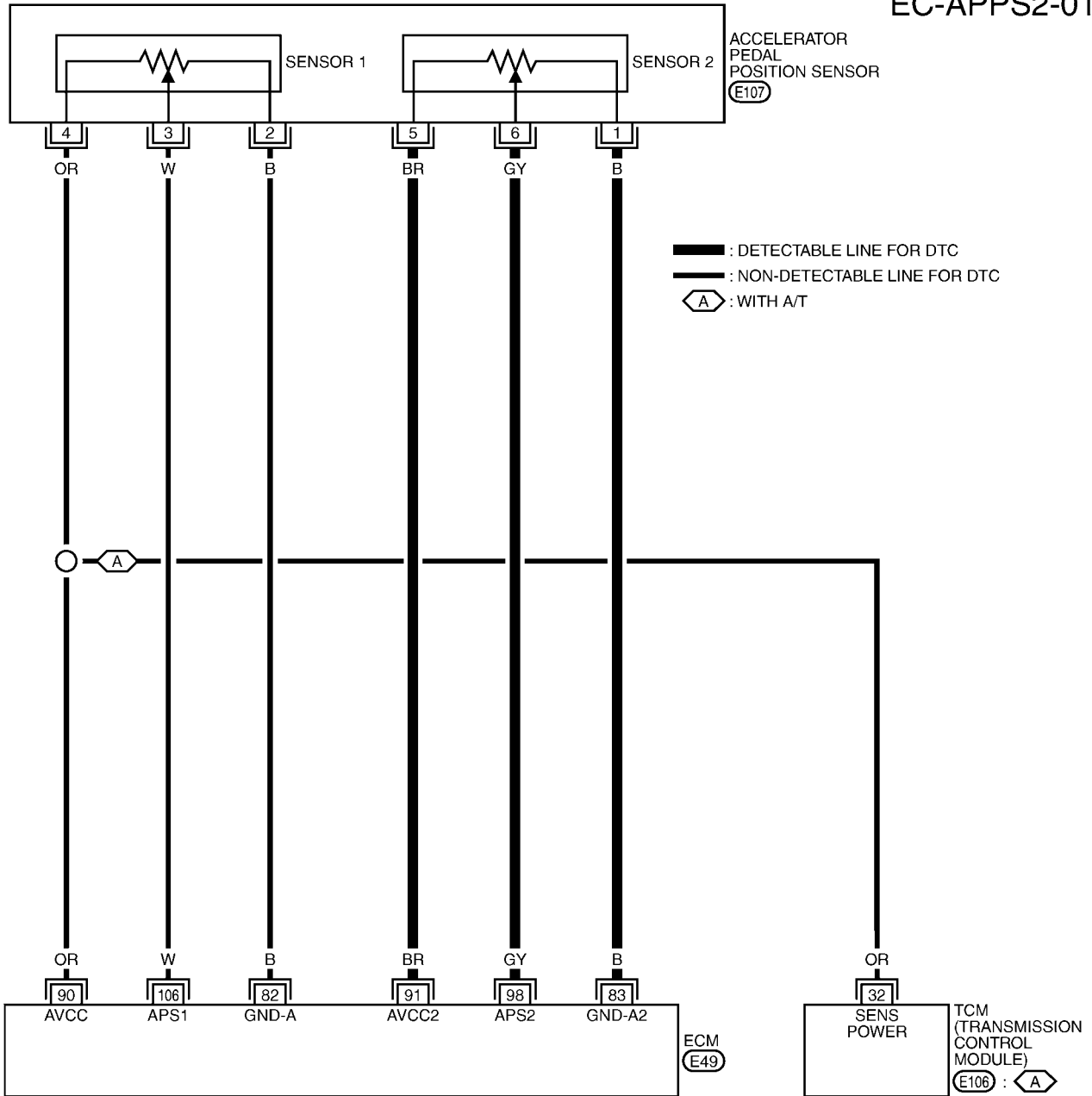
DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram LHD MODELS

EBS000P8

EC-APPS2-01



MBWA0292E

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

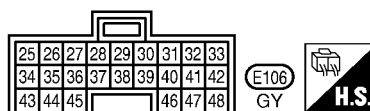
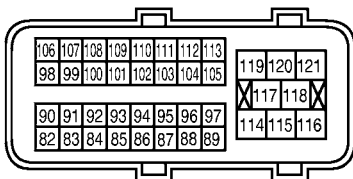
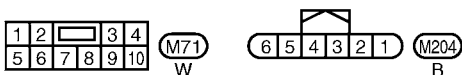
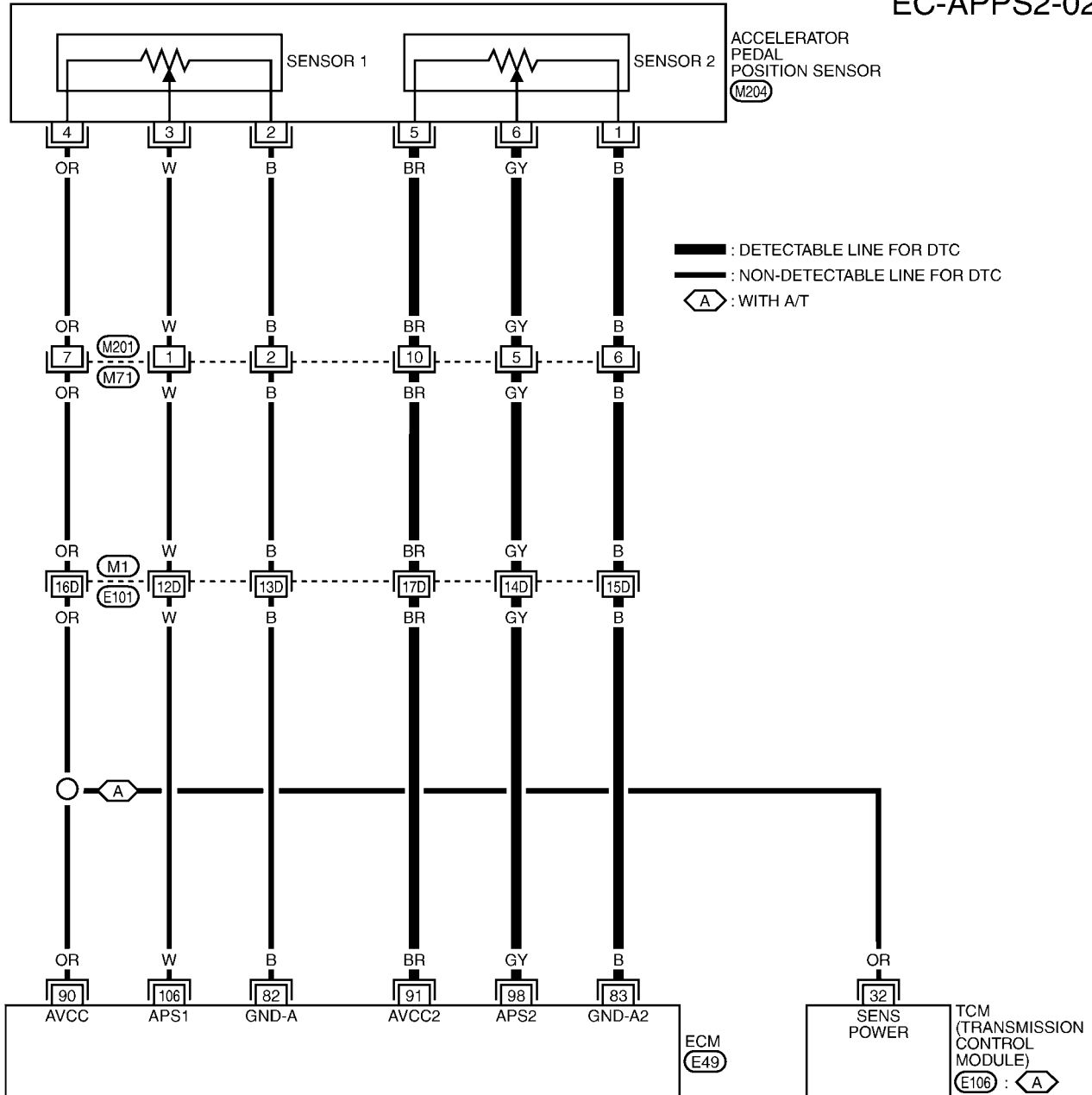
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

RHD MODELS

EC-APPS2-02



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor's ground (APP sensor 1)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
83	B	Sensor's ground (APP sensor 2)	[Ignition switch "ON"] ● Warm-up condition ● Idle speed	Approximately 0V
90	OR	Sensors' power supply (APP sensor 1)	[Ignition switch "ON"]	Approximately 5V
91	BR	Sensors' power supply (APP sensor 2)	[Ignition switch "ON"]	Approximately 5V
98	GY	Accelerator pedal position sensor 2	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.3 - 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully released	0.6 - 0.9V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	3.9 - 4.7V

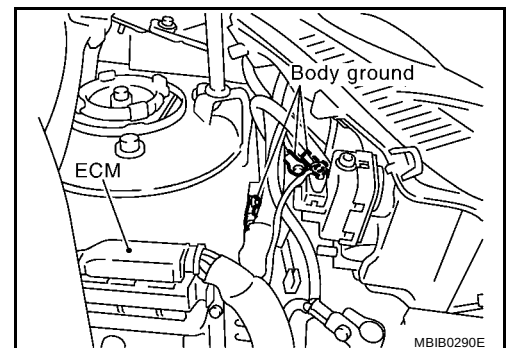
Diagnostic Procedure

EBS000P9

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.

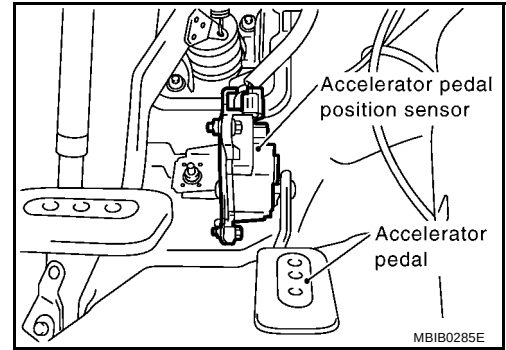


DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

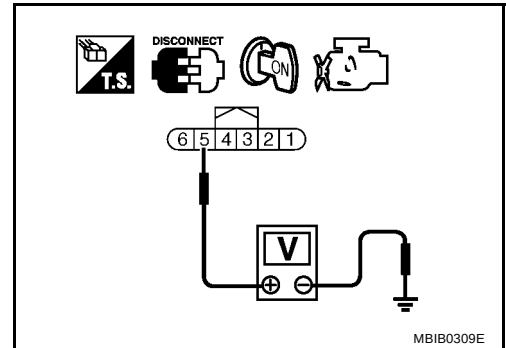


3. Check voltage between APP sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

4. 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 ECM terminal 83 and APP sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

6. 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 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

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

8. CHECK APP SENSOR

Refer to [EC-645, "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 9.

9. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-435, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-435, "Idle Air Volume Learning"](#).

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".

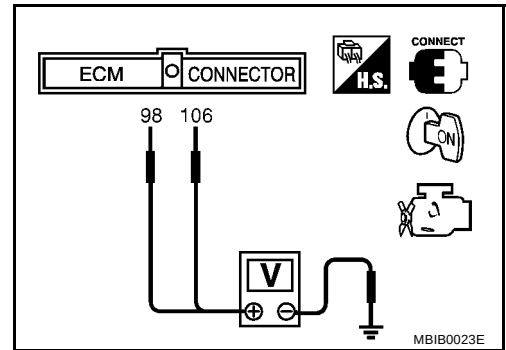
EBS000OPA

DTC P1227, P1228 APP SENSOR

[CR (WITHOUT EURO-OBD)]

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform [EC-435, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-435, "Idle Air Volume Learning"](#) .

Remove and Installation

ACCELERATOR PEDAL

Refer to [ACC-2, "ACCELERATOR CONTROL SYSTEM"](#) .

EBS000PB

DTC P1229 SENSOR POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

EBS000PC

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 (The TP sensor 1 and 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● ECM pin terminal

FAIL-SAFE MODE

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

EBS000PD

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-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-649, "Diagnostic Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

ⓧ WITHOUT CONSULT-II

1. Start engine and let it idle for 1 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-649, "Diagnostic Procedure"](#) .

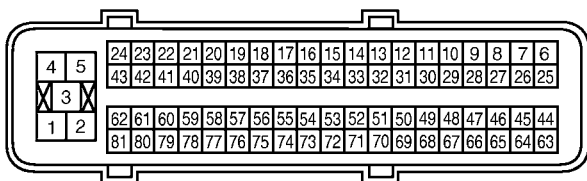
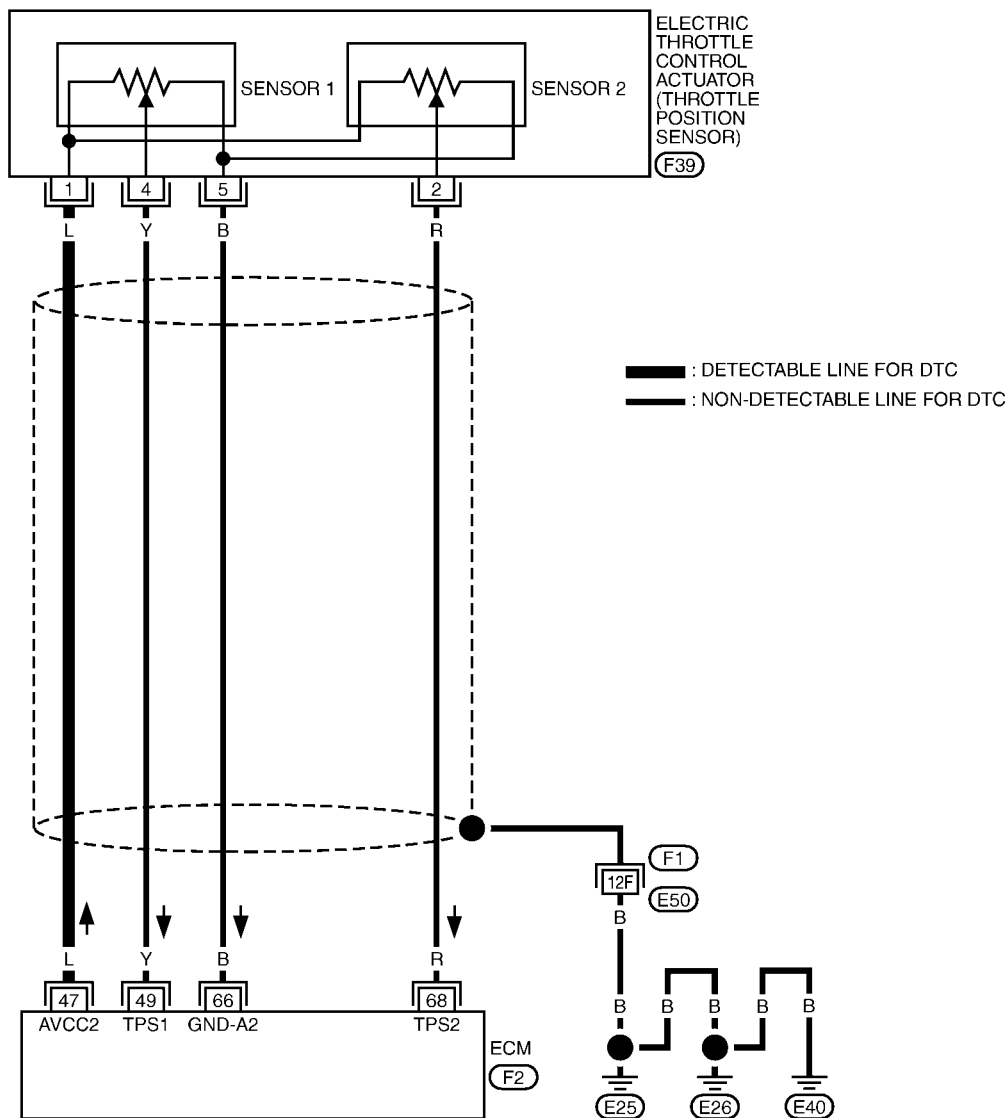
DTC P1229 SENSOR POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

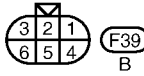
Wiring Diagram

EBS000PE

EC-SEN/PW-01



F2



F39 B

REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

DTC P1229 SENSOR POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor's power supply (Throttle position sensor)	[Ignition switch "ON"]	Approximately 5V

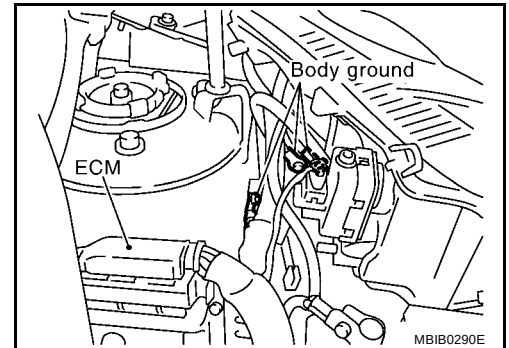
Diagnostic Procedure

EBS000PF

1. RETIGHTEN GROUND SCREWS

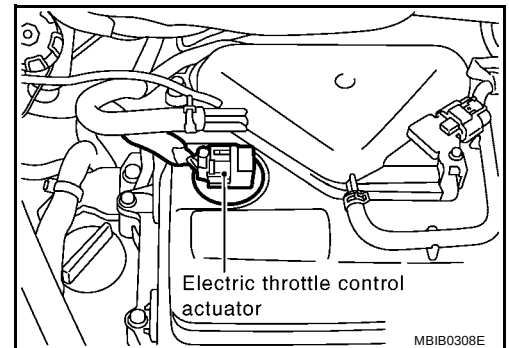
1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

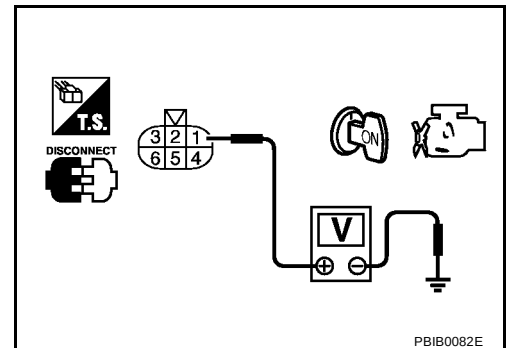


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



DTC P1229 SENSOR POWER SUPPLY

[CR (WITHOUT EURO-OBD)]

3. CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

Check the following.

- Harness for short to power and short to ground between ECM terminal 47 and electric throttle control actuator terminal 1.
- ECM pin terminal.

OK or NG

OK >> GO TO 4.

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

4. CHECK THROTTLE POSITION SENSOR

Refer to [EC-541, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform [EC-435, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-435, "Idle Air Volume Learning"](#) .

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

DTC P1805 BRAKE SWITCH

[CR (WITHOUT EURO-OBD)]

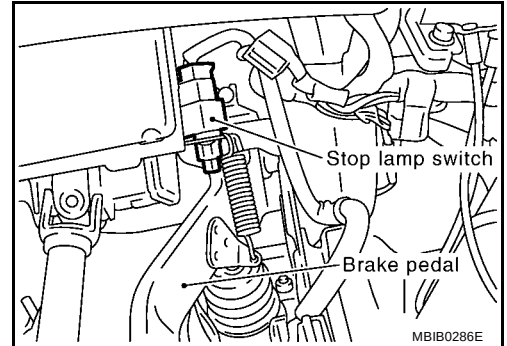
DTC P1805 BRAKE SWITCH

PFP:25320

Description

EBS000PG

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-II Reference Value in Data Monitor Mode

EBS000PH

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

EBS000PI

The MI will not light up for this self-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 an 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

EBS000PJ

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

Engine operation condition in fail-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

EBS000PK

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. If 1st trip DTC is detected, go to [EC-654, "Diagnostic Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC P1805 BRAKE SWITCH

[CR (WITHOUT EURO-OBD)]

WITHOUT CONSULT-II

1. Turn ignition switch "ON".
2. Fully depress the brake pedal at least 5 seconds.
3. Erase the "Diagnostic Test Mode II (Self-diagnostic results)" memory. Refer to [EC-442](#) .
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-654, "Diagnostic Procedure"](#) .

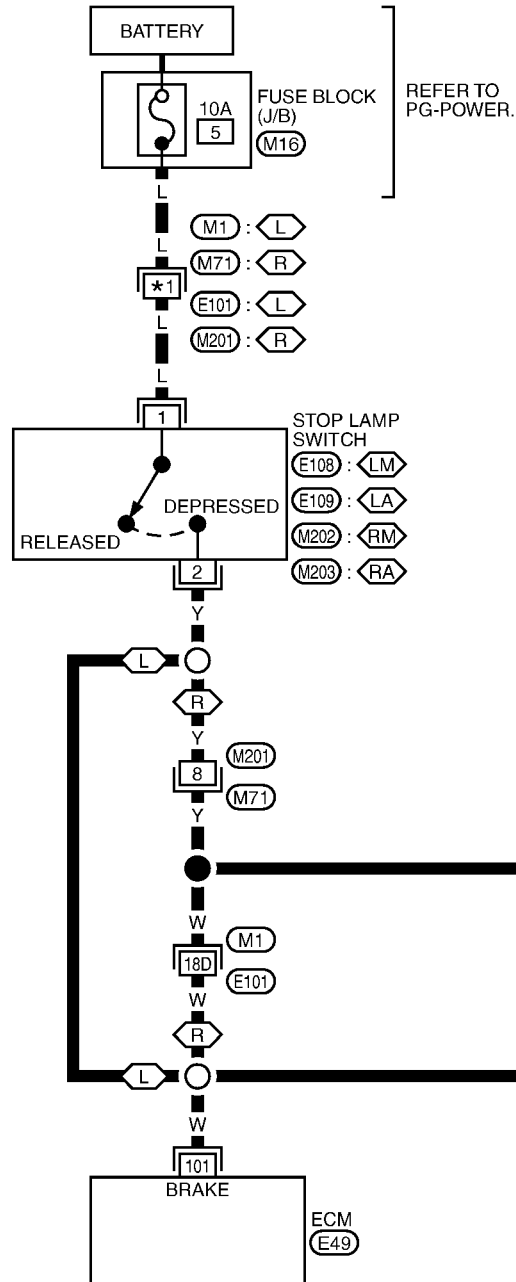
DTC P1805 BRAKE SWITCH

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000PL

EC-BRK/SW-01

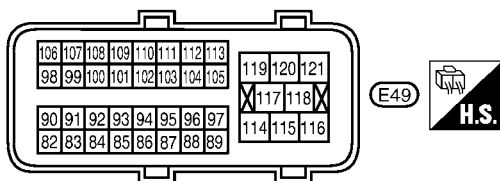
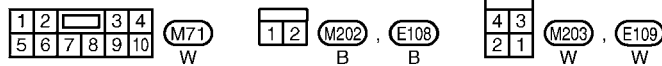


— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC

(L) : LHD MODELS
 (R) : RHD MODELS
 (LM) : LHD MODELS WITH M/T
 (LA) : LHD MODELS WITH A/T
 (RM) : RHD MODELS WITH M/T
 (RA) : RHD MODELS WITH A/T

*1 8D : (L)
 4 : (R)

TO LT-STOP/L



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

(M16) -FUSE BLOCK-JUNCTION BOX (J/B)

MBWA0295E

DTC P1805 BRAKE SWITCH

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	W	Stop lamp switch	[Engine is running] ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000PM

1. CHECK STOP LAMP SWITCH CIRCUIT

- Turn ignition switch "OFF".
- Check the stop lamp when depressing and releasing the brake pedal.

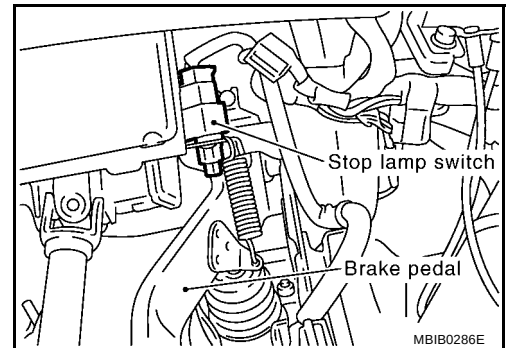
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

- OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Disconnect stop lamp switch harness connector.

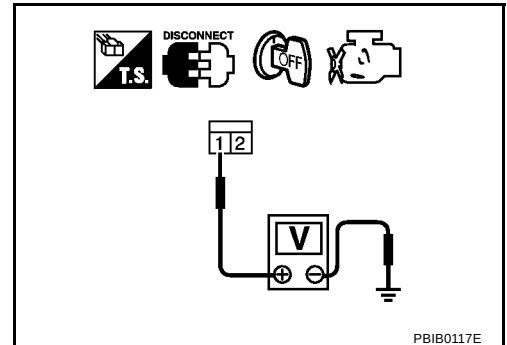


- Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M16
- Harness connectors M1, E101 (LHD models)
- Harness connectors M71, M201 (RHD models)
- Harness for open and short between stop lamp switch and fuse

>> 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. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp 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 >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, M201 (RHD models)
- Harness connectors M1, E101 (RHD models)
- Harness for open or short between ECM and stop lamp switch

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

6. CHECK STOP LAMP SWITCH

Refer to [EC-656, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

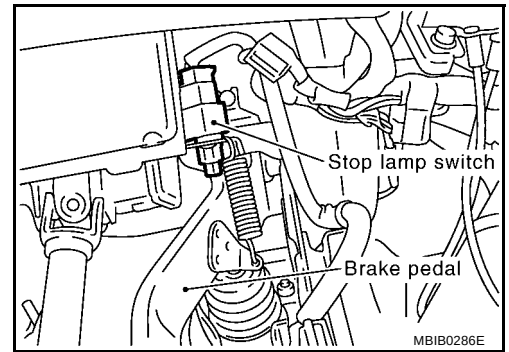
DTC P1805 BRAKE SWITCH

[CR (WITHOUT EURO-OBD)]

EBS000PN

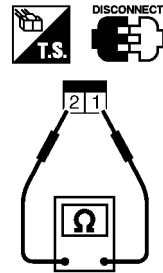
Component Inspection STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.

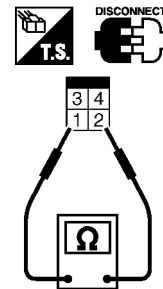


2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

(M/T models)



(A/T models)



Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to [BR-6, "BRAKE PEDAL"](#) , and perform step 2 again.

HO2S1 HEATER

[CR (WITHOUT EURO-OBD)]

HO2S1 HEATER

PFP:22690

Description SYSTEM DESCRIPTION

EBS000PO

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS000PP

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up	ON
	● Engine speed: Below 3,600 rpm	
	● Engine speed: Above 3,600 rpm	OFF

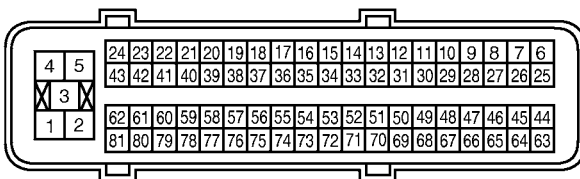
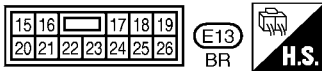
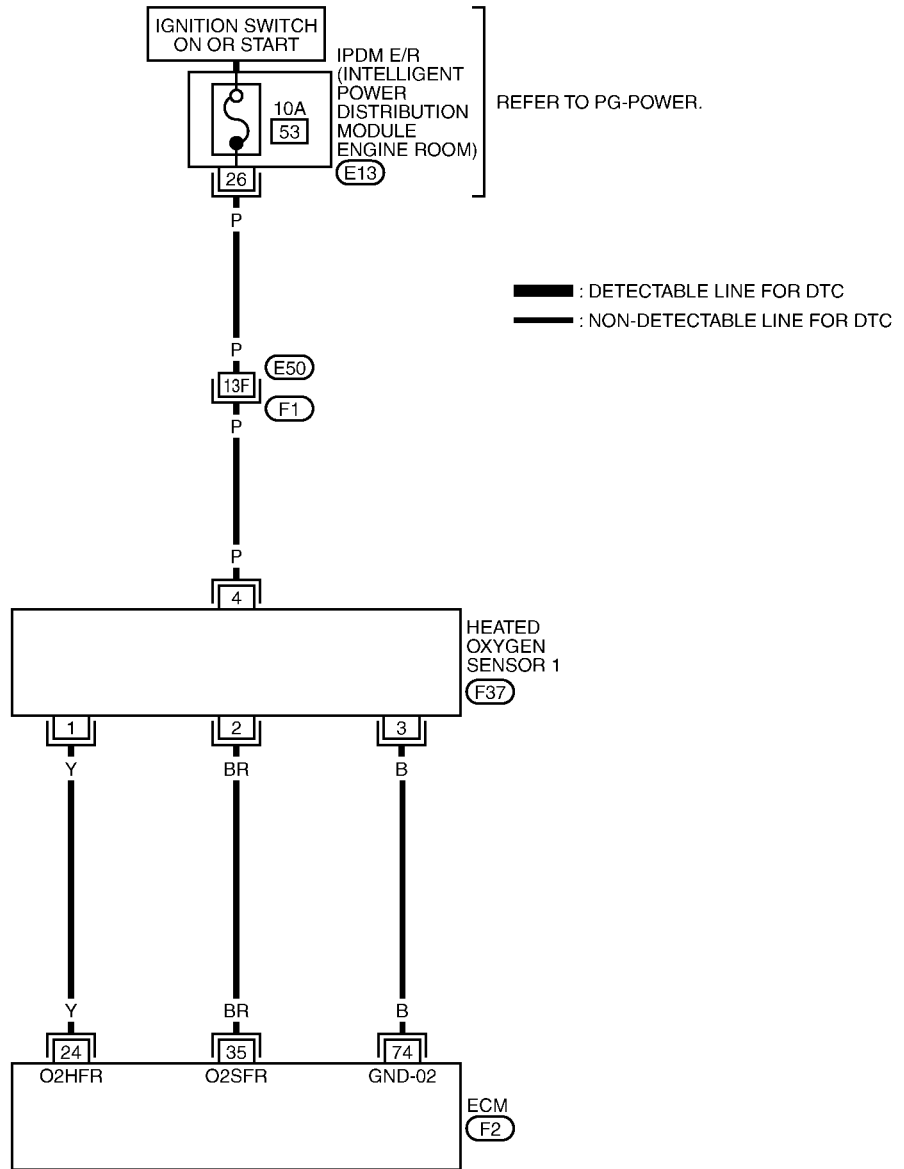
HO2S1 HEATER

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000PQ

EC-FRO2-01



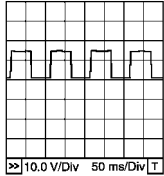
HO2S1 HEATER

[CR (WITHOUT EURO-OBD)]

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.

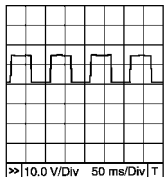
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	Y	Heated oxygen sensor 1 heater	[Engine is running] ● Warm-up condition. ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

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

Diagnostic Procedure

1. CHECK OVERALL FUNCTION

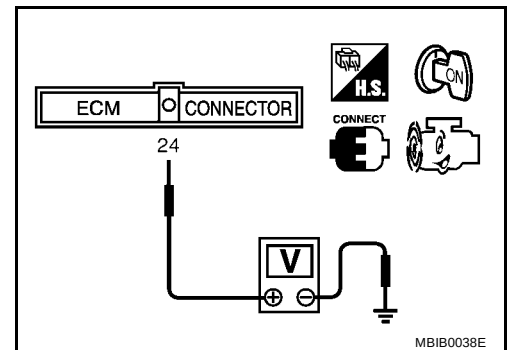
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Turn ignition switch "ON".
4. Set tester probe between ECM terminal 24 (HO2S1 heater signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
Verify that the oscilloscope screen shows the signal waves as shown below.

Conditions	Voltage
At idle	Approximately 7.0V★  PBIB0519E
Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

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

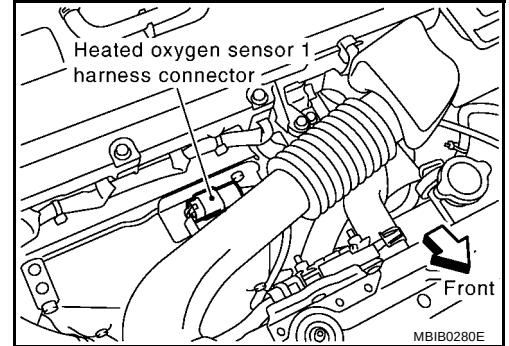
OK or NG

- OK >> **INSPECTION END**
 NG >> **GO TO 2.**



2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch "ON".

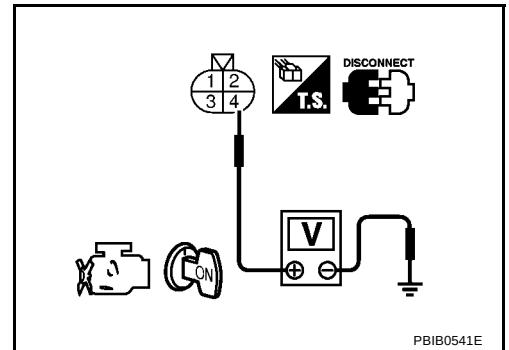


4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R connector E13
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

4. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 24 and HO2S1 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 >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-661, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1 HEATER

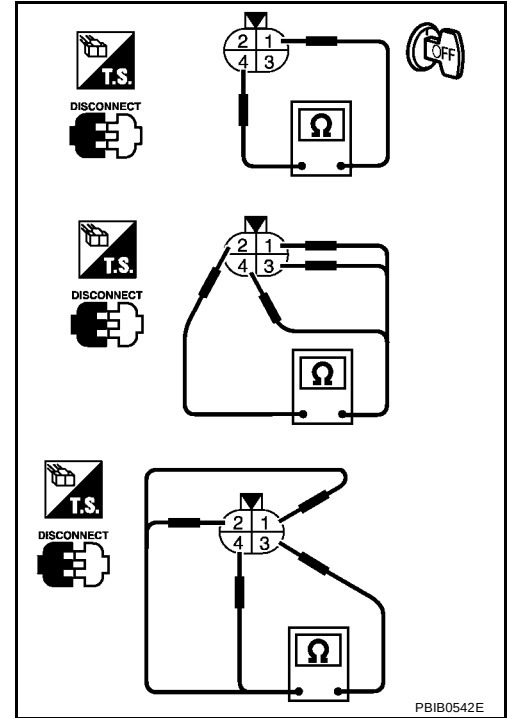
1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω at 25°C (77°F)
2 and 1, 3, 4	$\infty \Omega$ (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, replace heated oxygen sensor 1.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

HO2S2 HEATER

[CR (WITHOUT EURO-OBD)]

HO2S2 HEATER

PFP:226A0

Description SYSTEM DESCRIPTION

EBS000PU

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
Engine coolant temperature sensor	Engine coolant temperature		
Manifold absolute pressure (MAP) 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 3,800	OFF
- Below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS000PV

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	- Engine speed is below 3,800 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	ON
	Engine speed: Above 3,800 rpm	OFF

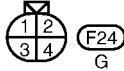
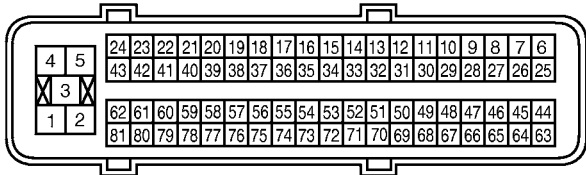
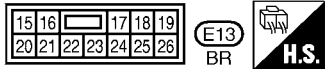
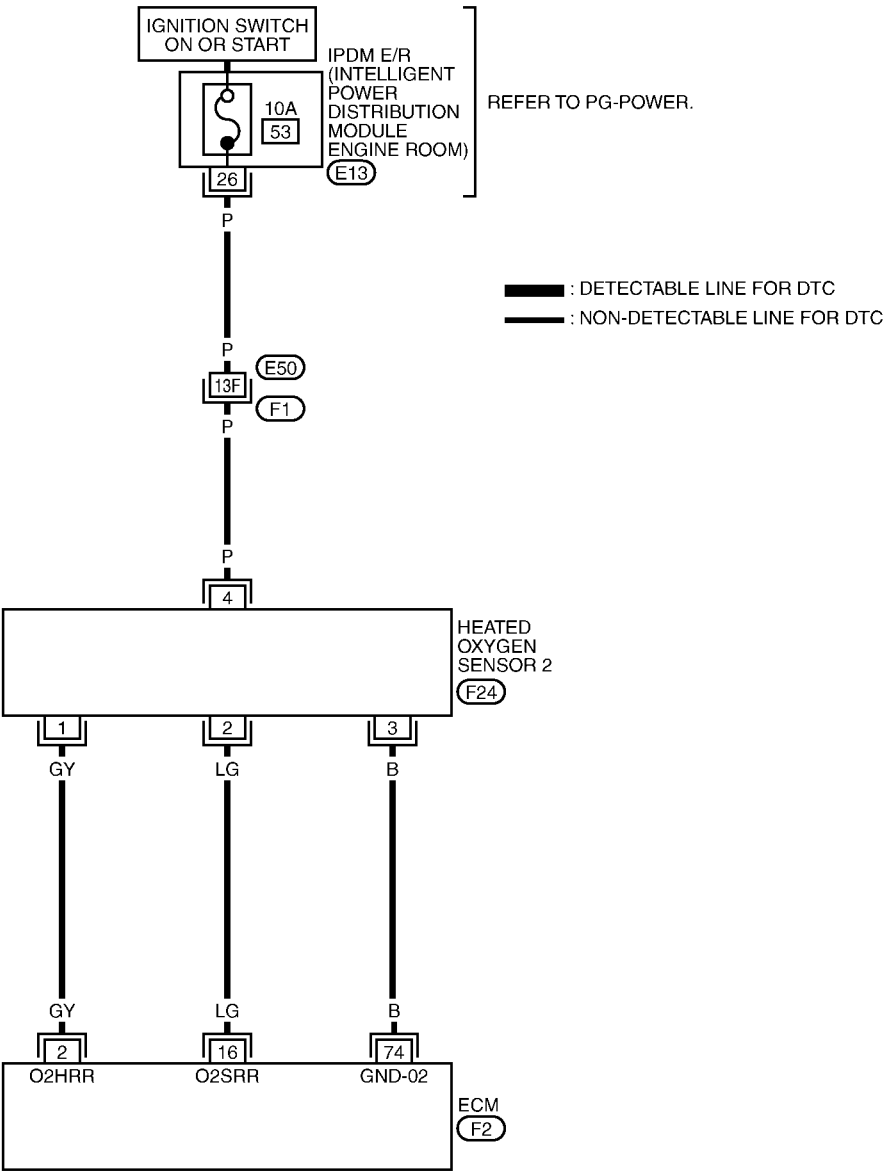
HO2S2 HEATER

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000PW

EC-RRO2-01



REFER TO THE FOLLOWING.
(F1) -SUPER MULTIPLE
JUNCTION (SMJ)

HO2S2 HEATER

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	GY	Heated oxygen sensor 2 heater	[Engine is running] ● Engine speed: Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped [Engine is running] ● Engine speed is above 3,800 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS000PX

1. CHECK OVERALL FUNCTION

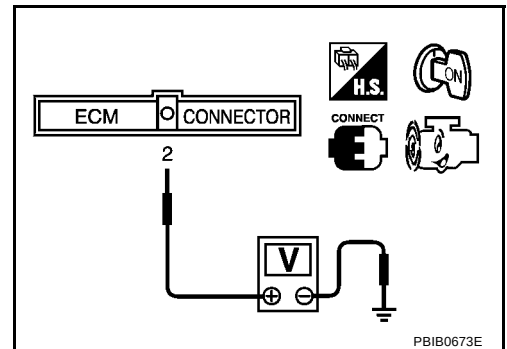
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 2 (HO2S2 heater signal) and ground.
6. Check the voltage under the following conditions.

Conditions	Voltage
At idle	0 - 1V
Engine speed is above 3,800 rpm.	Battery voltage

OK or NG

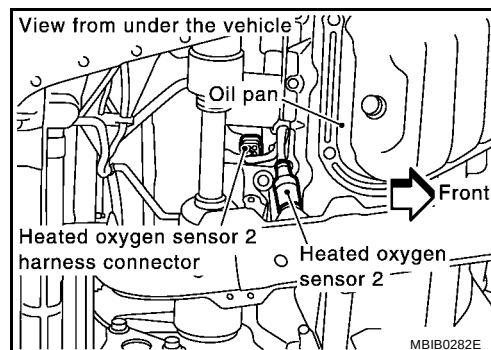
OK >> **INSPECTION END**

NG >> GO TO 2.



2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch "ON".

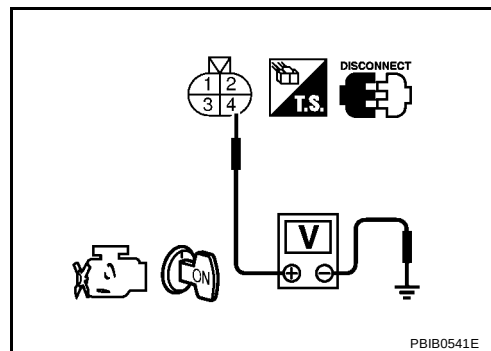


4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R connector E13
- 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 2 and HO2S2 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 >> 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-666, "Component Inspection"](#).

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2 HEATER

EBS000PY

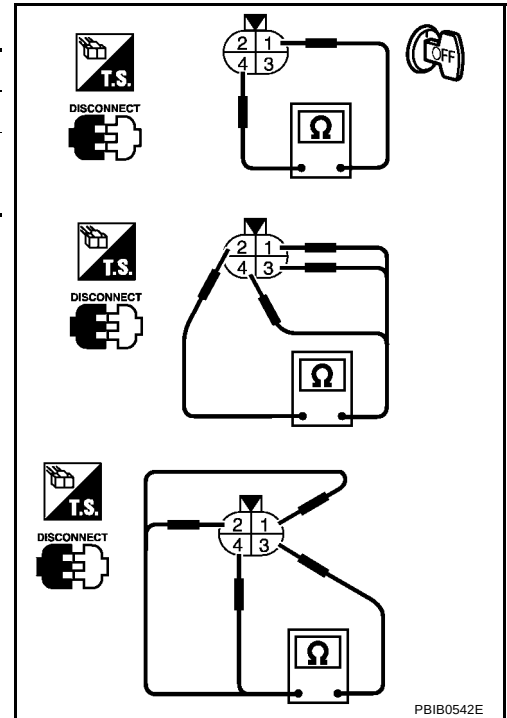
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω at 25°C (77°F)
2 and 1, 3, 4	$\infty \Omega$ (Continuity should not exist)
3 and 1, 2, 4	

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



PBIB0542E

EBS000PZ

Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

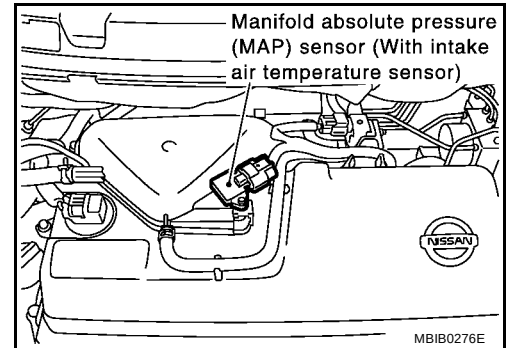
IAT SENSOR

PFP:22630

Component Description

The intake air temperature sensor is built into manifold absolute pressure 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 temperature rise.



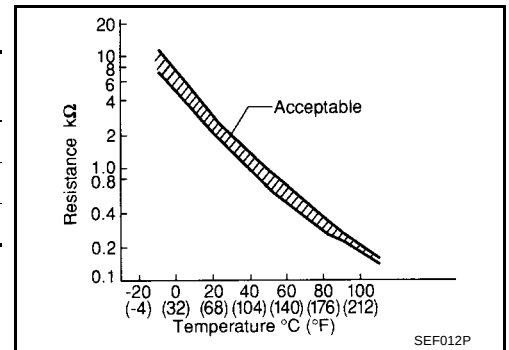
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are 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.



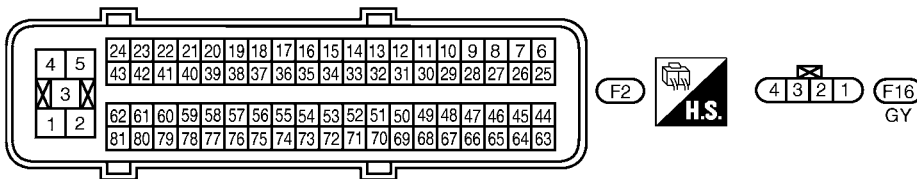
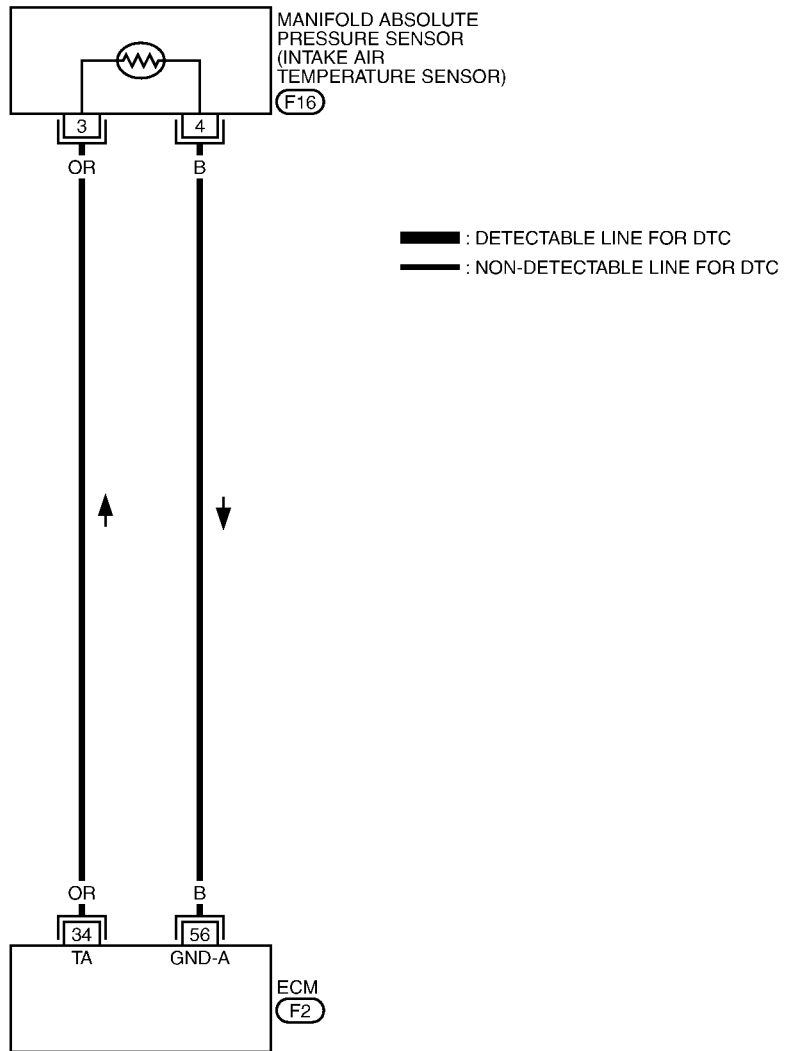
IAT SENSOR

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000Q1

EC-IATSEN-01



MBWA0466E

Diagnostic Procedure

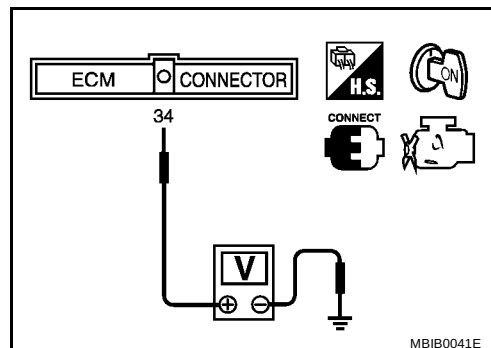
EBS000Q2

1. CHECK OVERALL FUNCTION

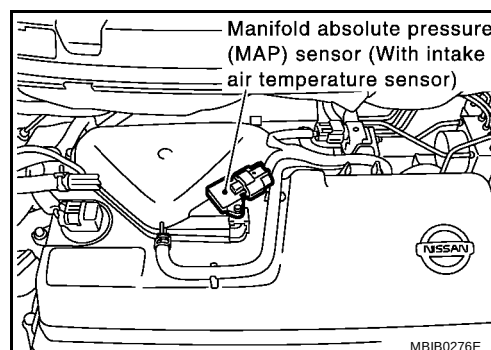
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 34 and ground with CONSULT-II or tester.

Voltage: 0.04 - 4.84VOK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.

**2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT**

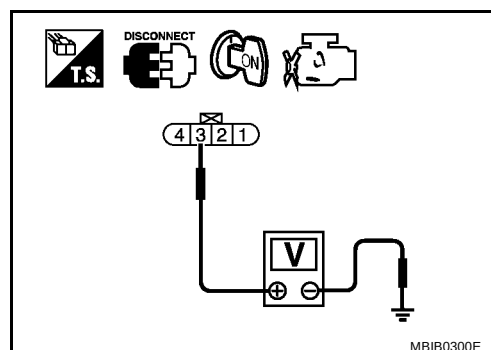
1. Turn ignition switch "OFF".
2. Disconnect manifold absolute pressure sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch "ON".



4. Check voltage between MAP sensor terminal 3 and ground.

Voltage: Approximately 5VOK 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. Check harness continuity between MAP sensor terminal 4 and ECM terminal 56. 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 >> Repair harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-670, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace manifold absolute pressure sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

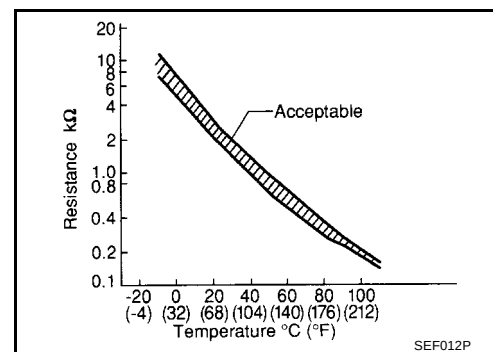
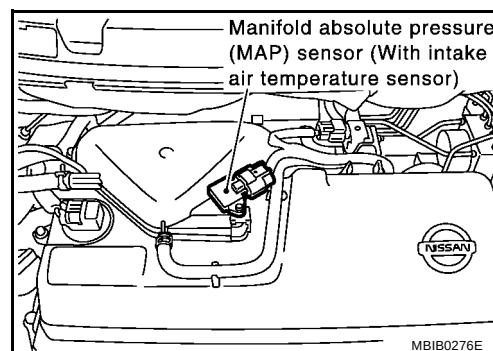
Component Inspection INTAKE AIR TEMPERATURE SENSOR

EBS000Q3

1. Check resistance between manifold absolute pressure sensor terminals 3 and 5 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace manifold absolute pressure sensor (with intake air temperature sensor).



Removal and Installation MANIFOLD ABSOLUTE PRESSURE SENSOR

EBS000Q4

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

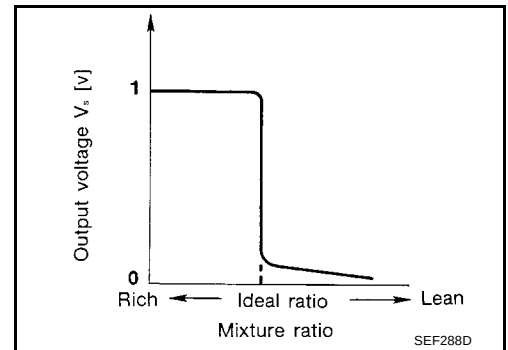
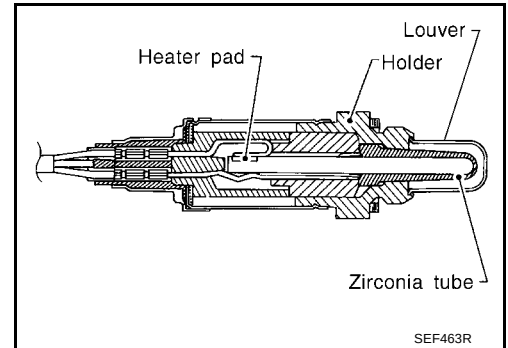
HO2S1

PFP:22690

Component Description

EBS000Q5

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

**CONSULT-II Reference Value in Data Monitor Mode**

EBS000Q6

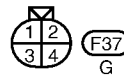
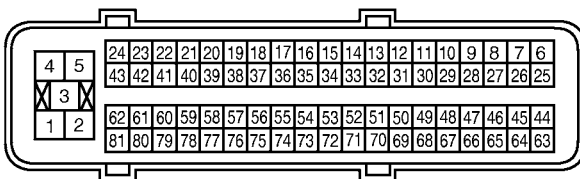
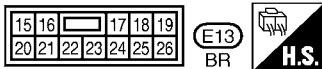
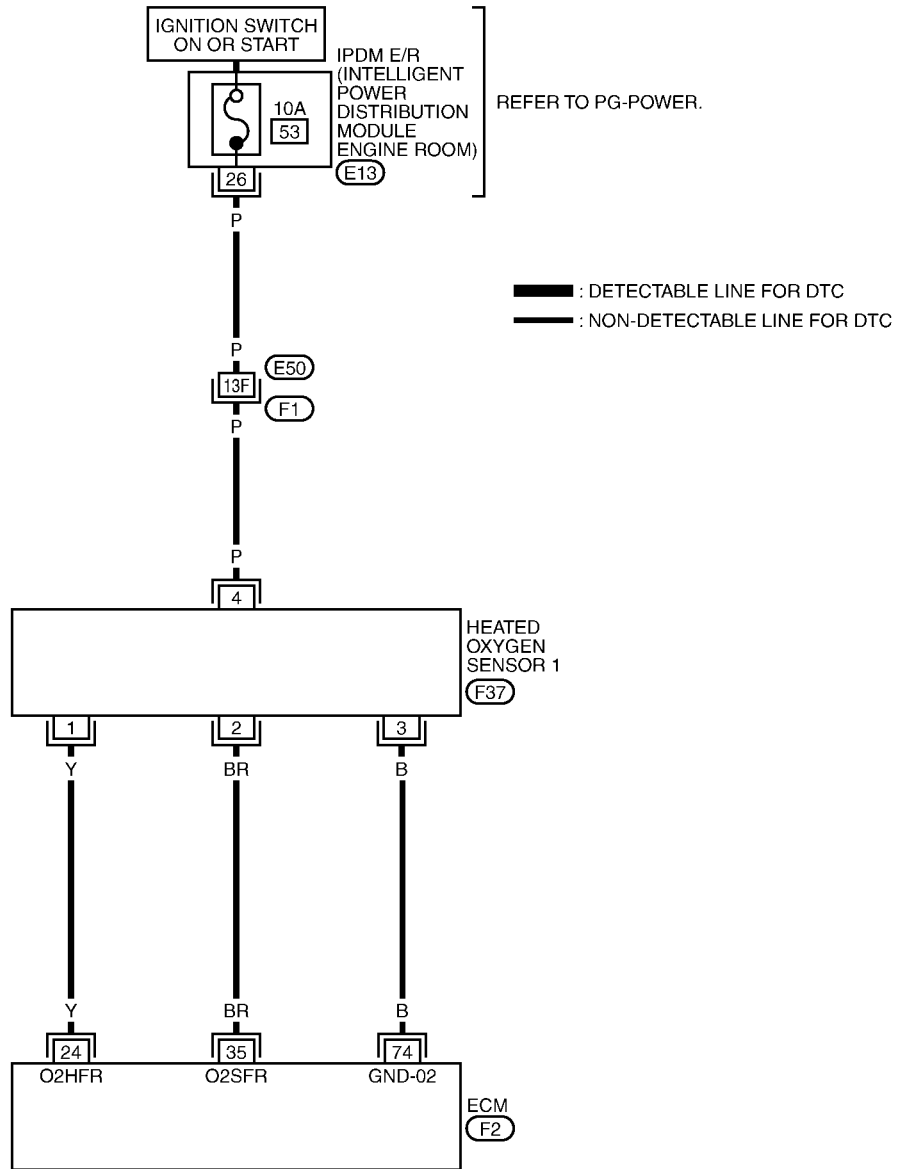
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

Wiring Diagram

EBS000Q7

EC-FRO2-01



REFER TO THE FOLLOWING.

(F1) -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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	BR	Heated oxygen sensor 1	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

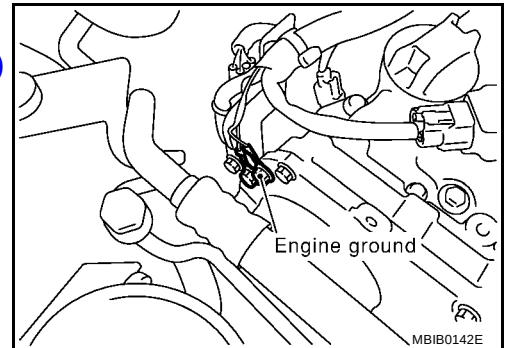
EBS000Q8

1. INSPECTION START

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "HO2S1 MNTR (B1)" in "DATA MONITOR" mode with CONSULT-II.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuates between LEAN and RICH more than five times in 10 seconds.

1 time: RICH → LEAN → RICH

2 times: RICH → LEAN → RICH → LEAN → RICH

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	RICH

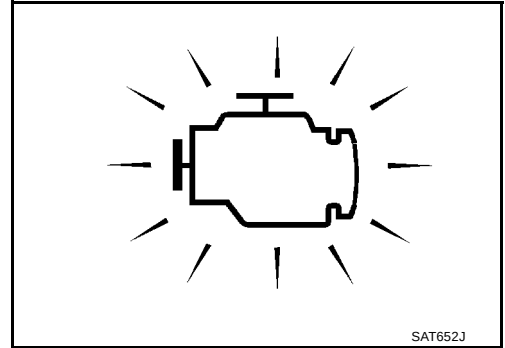
SEF820Y

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Set ECM in "Diagnostic test mode - II (Heated oxygen sensor 1 monitor)".
Refer to [EC-442, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
4. Keep the engine speed at 2,000 rpm under no load, and make sure that the MI comes ON more than five times in 10 seconds.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.



3. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

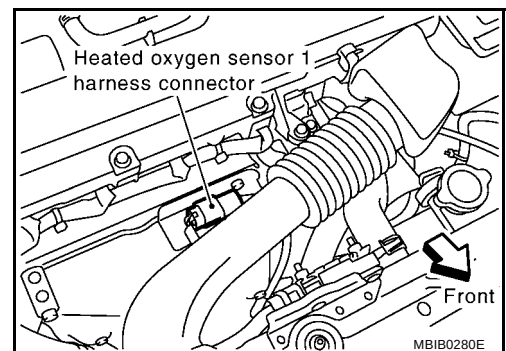
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
Refer to Wiring Diagram.

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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. 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 1

Refer to [EC-675, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 1

EBS000Q9

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

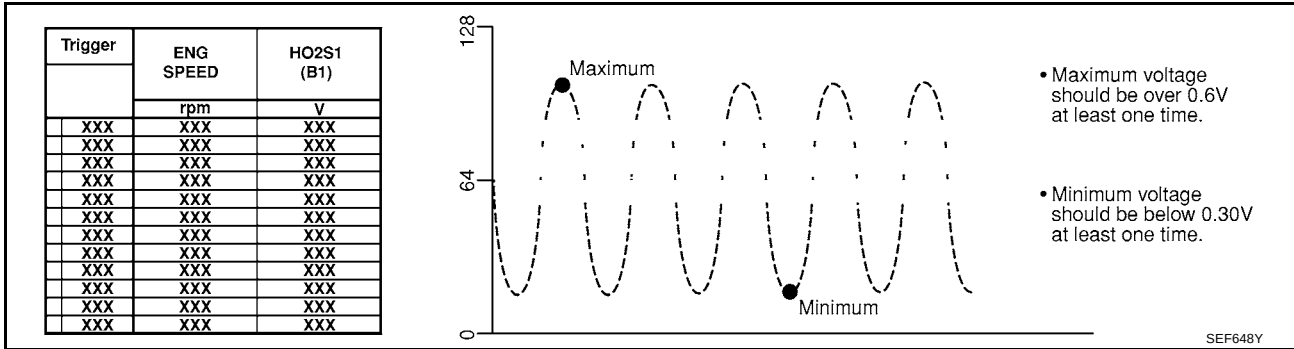
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

MBIB0301E

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
5 times (cycles) are counted as shown at right.
 - "HO2S1 (B1)" voltage goes above 0.6V at least once.
 - "HO2S1 (B1)" voltage goes below 0.3V at least once.
 - "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R	L	R	L	R	L
R means HO2S1 MNTR (B1) indicates RICH						
L means HO2S1 MNTR (B1) indicates LEAN						

SEF217YA



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

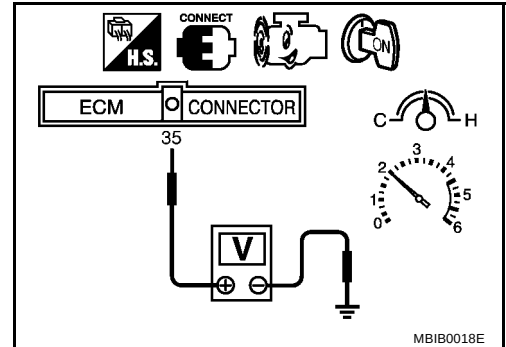
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Removal and Installation
HEATED OXYGEN SENSOR 1**

EBS000QA

Refer to [EM-20, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](#) .

HO2S2

PFP:226A0

Component Description

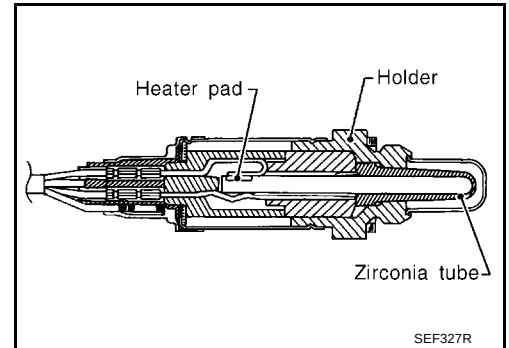
EBS000QB

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 heated oxygen 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-II Reference Value in Data Monitor Mode

EBS000QC

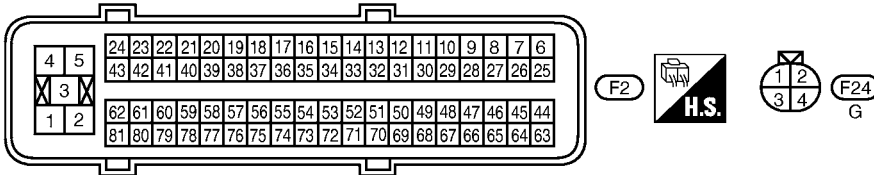
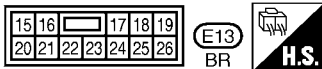
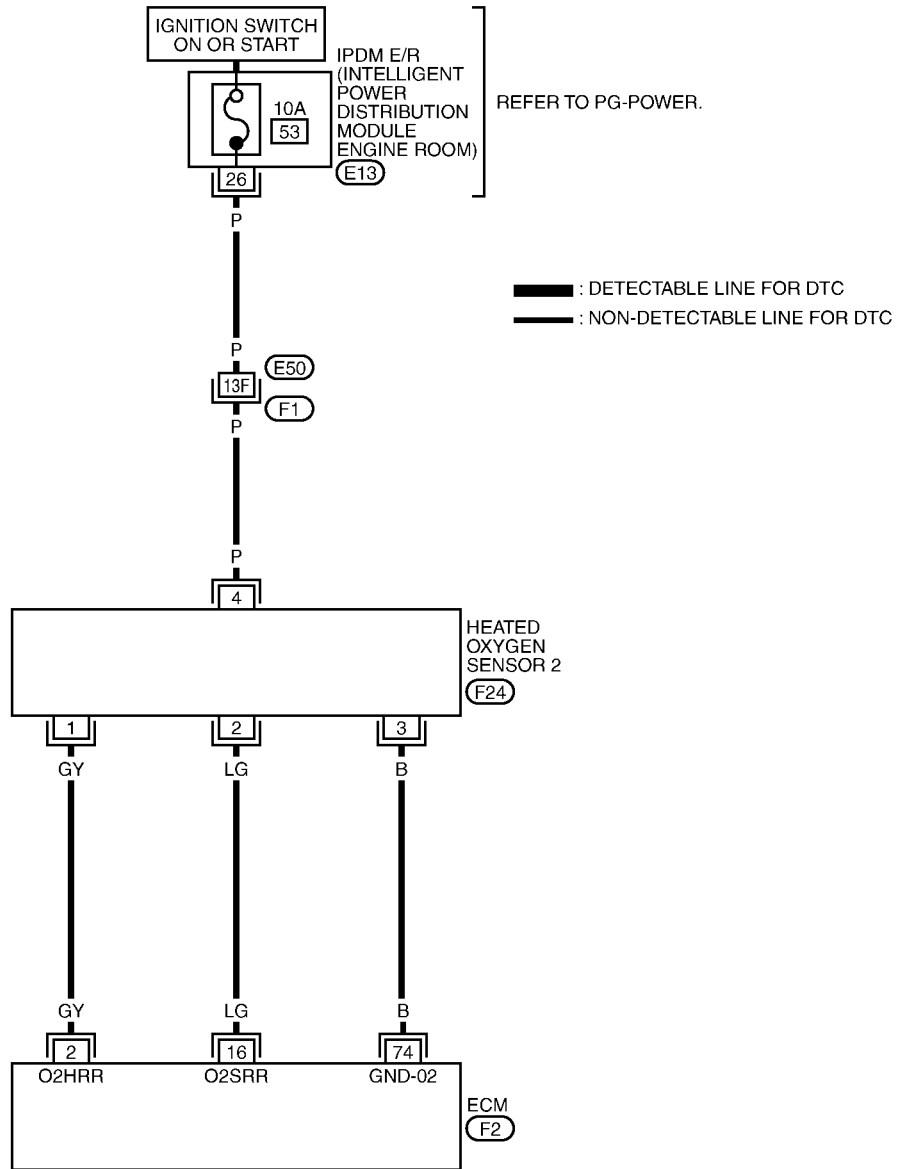
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up		0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revvng engine from idle to 3,000 rpm quickly.	LEAN $\longleftrightarrow$ RICH

Wiring Diagram

EBS00OQD

EC-RRO2-01



REFER TO THE FOLLOWING.

(F1) -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.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	LG	Heated oxygen sensor 2	[Engine is running] ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS000QE

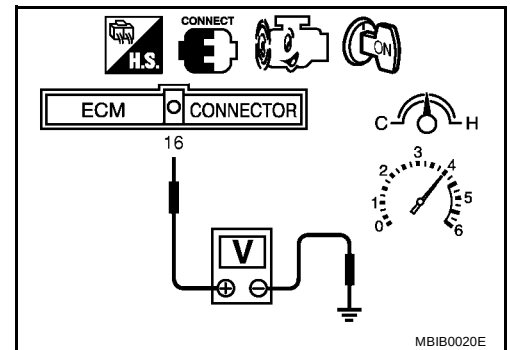
1. CHECK OVERALL FUNCTION-I

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage while revving 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 16 and ground, or check voltage when coasting 80 km/h (50 MPH) in 3rd gear (M/T) or "D" position (A/T).

The voltage does not remain in the range of 0.2 - 0.4V

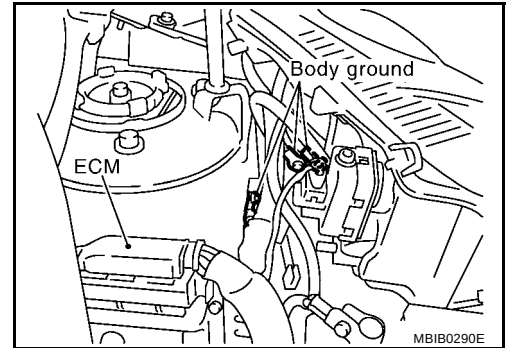
OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 3.

3. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten body ground screws.

>> GO TO 4.



4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
Refer to Wiring Diagram.

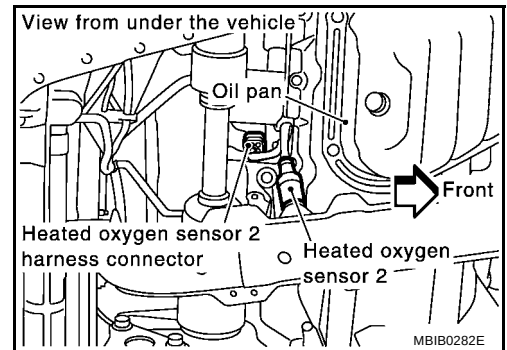
Continuity should exist.

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

OK or NG

OK >> GO TO 5.

NG >> 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. Check harness continuity between ECM terminal 16 and HO2S2 terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for 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-681, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection HEATED OXYGEN SENSOR 2

EBS000QF

With CONSULT-II

- Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

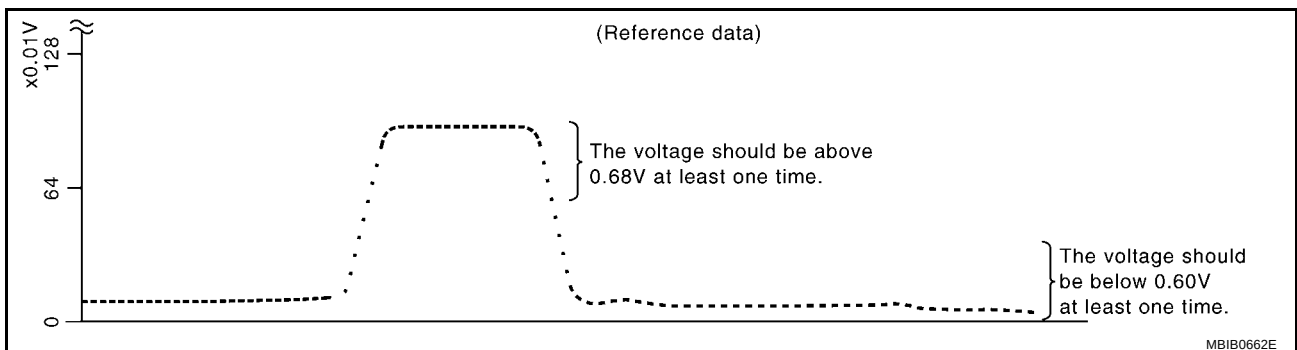
SEF174Y

- 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 one minute under no load.
- Let engine idle for one minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

- Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

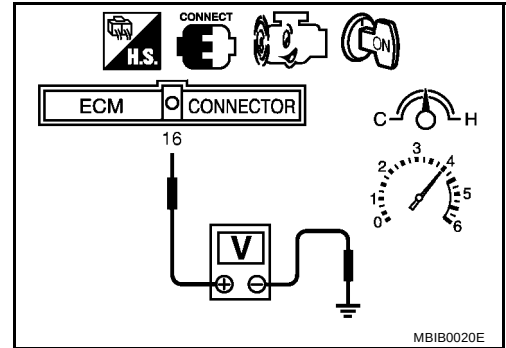
"HO2S2 (B1)" should be below 0.60V at least once when the "FUEL INJECTION" is -25%.

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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

⊗ Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] and engine 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 idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position (A/T), 3rd gear position (M/T).
The voltage should be below 0.60V 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 tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

EBS00OQG

IGNITION SIGNAL

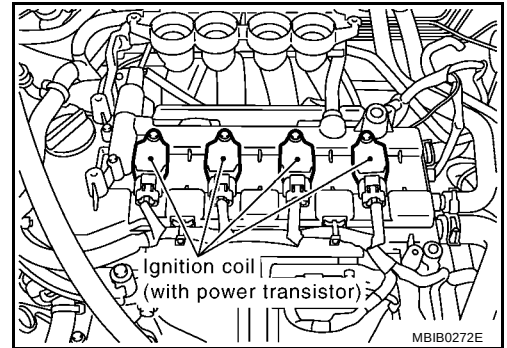
PFP:22448

Component Description

EBS00OQH

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.



A

EC

C

D

E

F

G

H

I

J

K

L

M

IGNITION SIGNAL

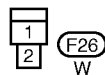
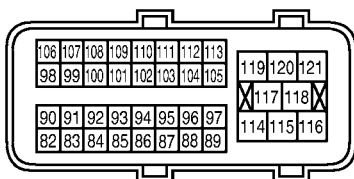
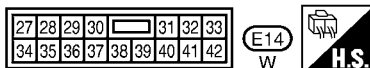
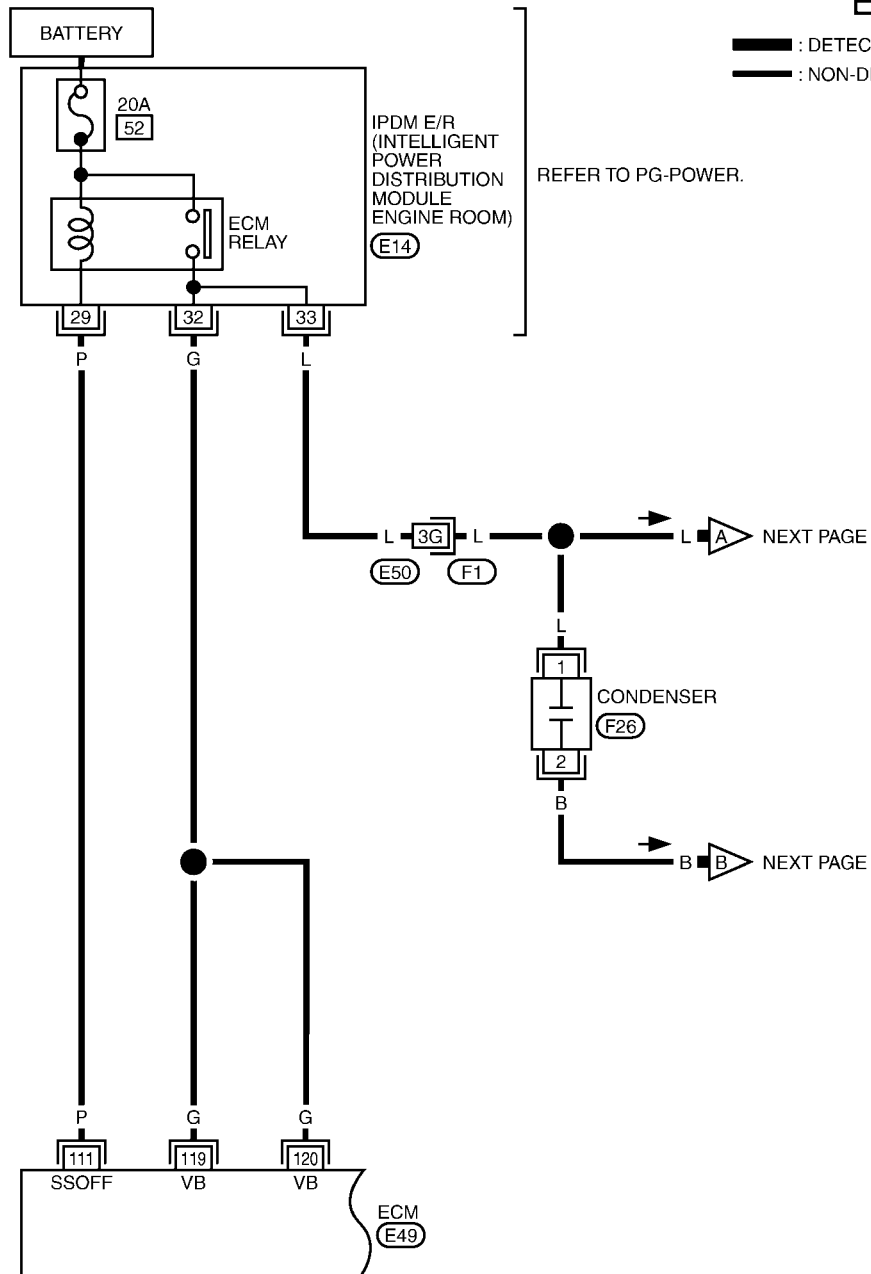
[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000QI

EC-IGNSYS-01

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



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0296E

IGNITION SIGNAL

[CR (WITHOUT EURO-OBD)]

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.

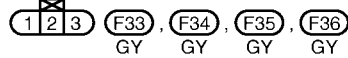
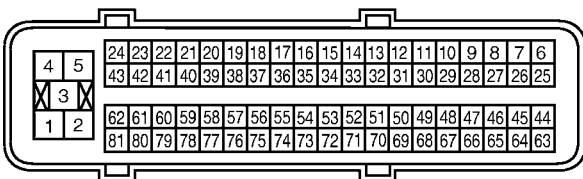
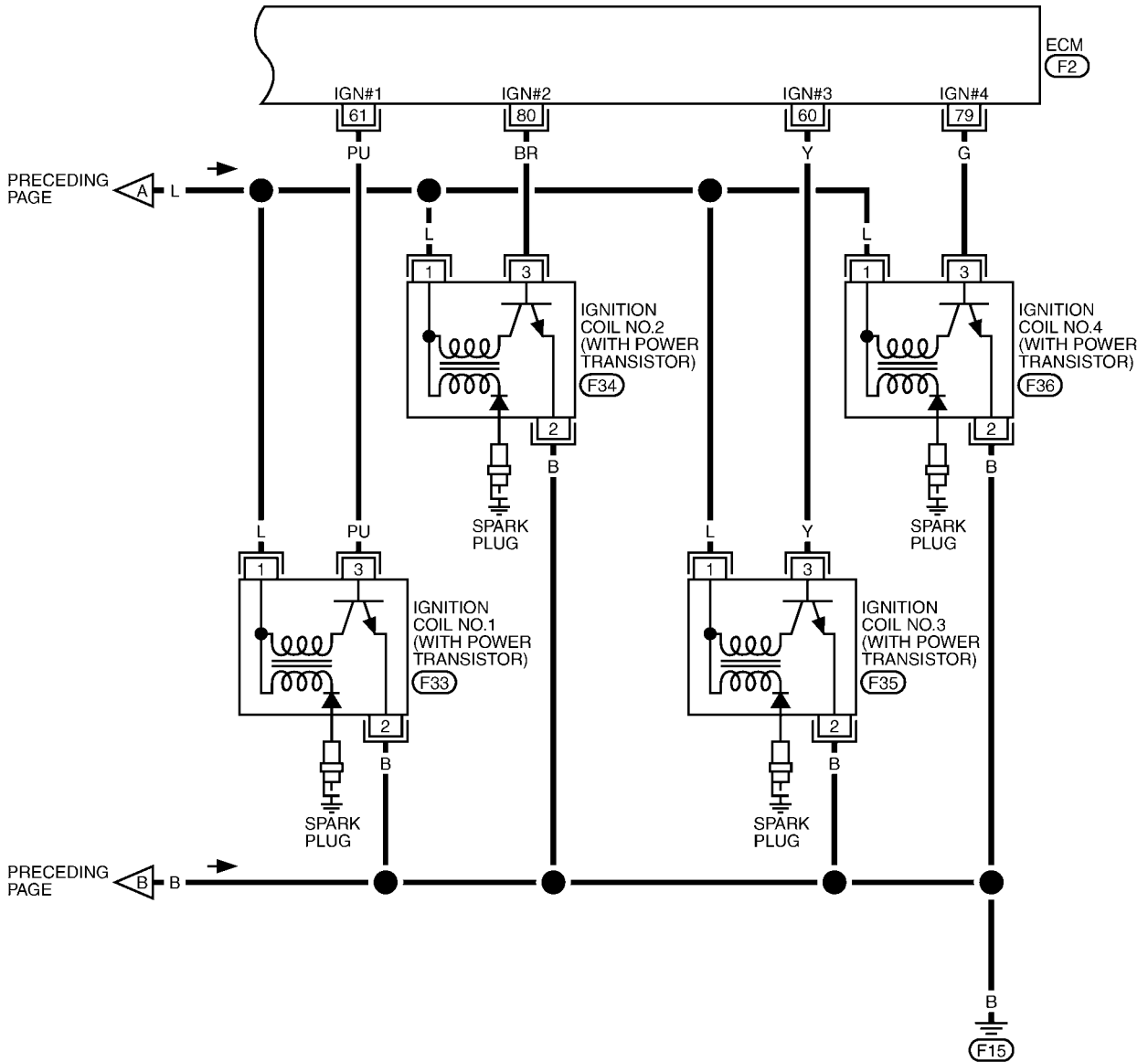
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	P	ECM relay (Self shut-off)	[Engine is running] [Ignition switch "OFF"] ● For 5 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 5 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	G	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

IGNITION SIGNAL

[CR (WITHOUT EURO-OBD)]

EC-IGNSYS-02

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



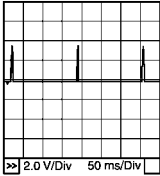
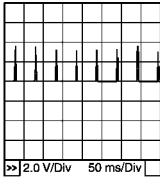
IGNITION SIGNAL

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	Y PU G BR	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	[Engine is running] - Warm-up condition - Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] - Warm-up condition - Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

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

Diagnostic Procedure

1. CHECK ENGINE START

Turn ignition switch "OFF", and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.

Yes (Without CONSULT-II)>>GO TO 3.

No >> GO TO 4.

2. CHECK OVERALL FUNCTION

 **With CONSULT-II**

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 9.

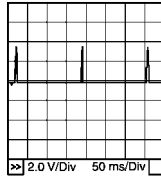
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

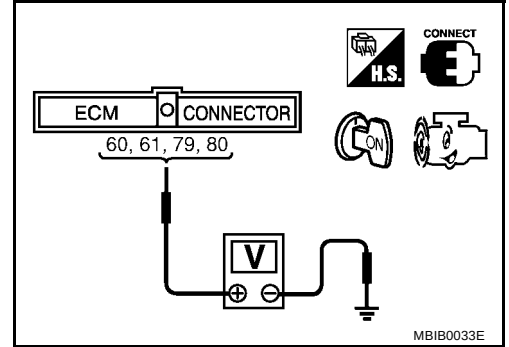
3. CHECK OVERALL FUNCTION

⊗ Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



PBIB0521E



MBIB0033E

OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 9.

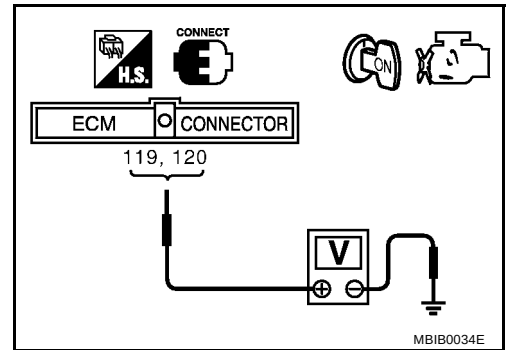
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

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-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
 NG >> Go to [EC-500, "POWER SUPPLY CIRCUIT FOR ECM"](#)



MBIB0034E

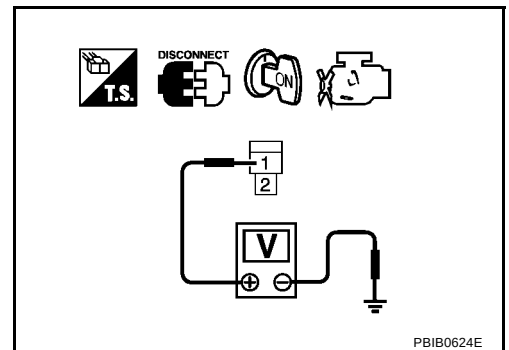
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.
3. Turn ignition switch "ON".
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



PBIB0624E

6. DETECT MALFUNCTION PART

Check the following.

- IPDM E/R harness connector E14
- Harness connectors E50, F1

>> Repair or replace

7. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser 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 8.

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

8. CHECK CONDENSER

Refer to [EC-690, "Component Inspection"](#).

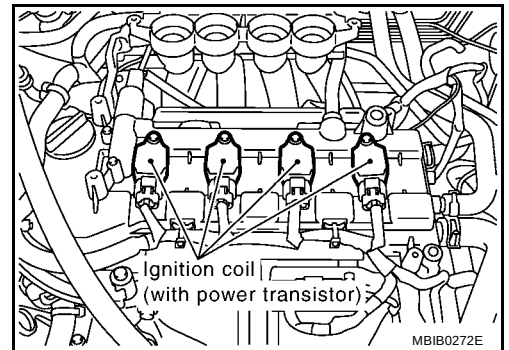
OK or NG

OK >> GO TO 9.

NG >> Replace condenser.

9. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch "OFF".
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch "ON".



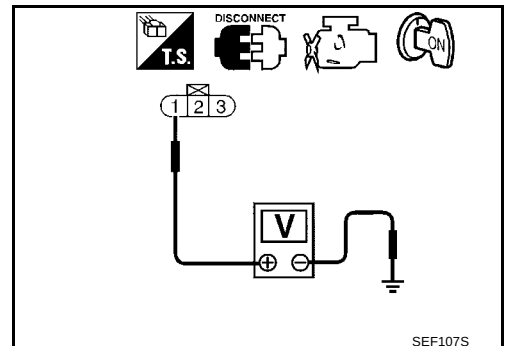
5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.



10. DETECT MALFUNCTIONING PART

Check harness for open or short between ignition coil and IPDM E/R.

>> Repair or replace harness or connectors.

11. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between ignition coil terminal 2 and engine ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 12.

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

12. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3.
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 IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-690, "Component Inspection"](#) .

OK or NG

OK >> GO TO 14.

NG >> Replace ignition coil with power transistor.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

Component Inspection CONDENSER

EBS00OQK

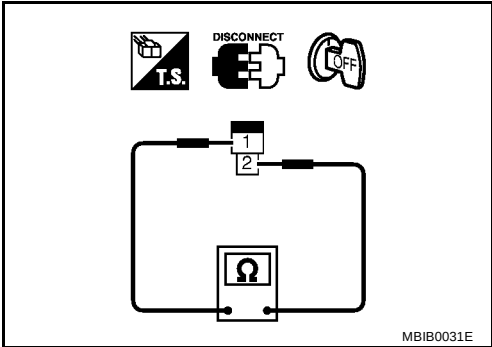
1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.

IGNITION SIGNAL

[CR (WITHOUT EURO-OBD)]

3. Check resistance between condenser terminals 1 and 2.

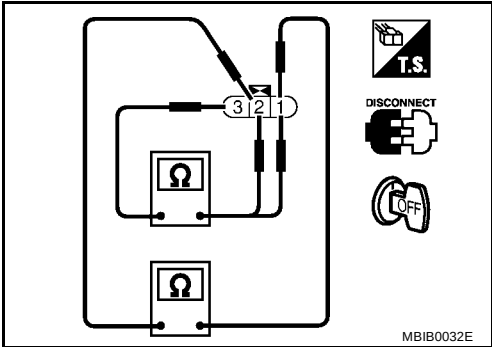
Resistance: Above 1 MΩ at 25°C (77°F)



IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
2 and 3	Except 0 or ∞
1 and 2	Except 0
1 and 3	



Removal and Installation IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-25, "IGNITION COIL"](#) .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITHOUT EURO-OBDD)]

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description SYSTEM DESCRIPTION

EBS00OQM

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 volume control solenoid valve
Manifold absolute pressure 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	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed signal*2	Vehicle speed		

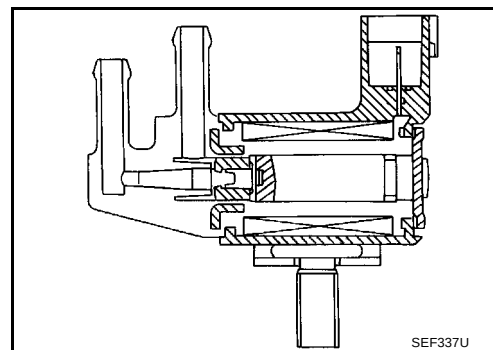
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*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-II Reference Value in Data Monitor Mode

EBS00OQM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	- Engine: After warming up - Shift lever: N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No-load	Idle	0%
		2,000 rpm	20 - 30%

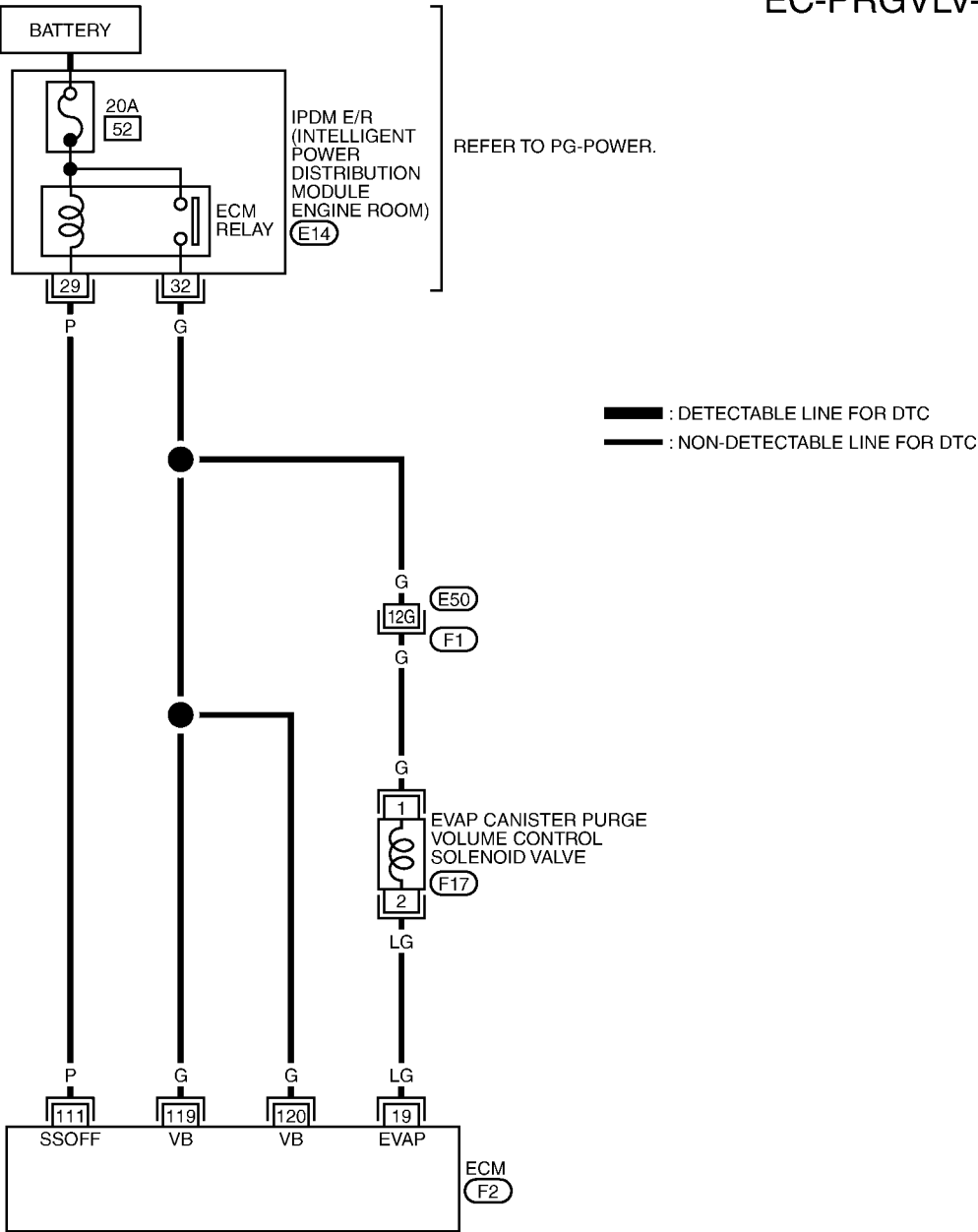
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS00OQO

EC-PRGVLV-01

A
EC
C
D
E
F
G
H
I
J
K
L
M



27	28	29	30	31	32	33
34	35	36	37	38	39	40
41	42					

E14
W



4	5	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
3	3	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
1	2	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
		81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63

F2



2 1 F17
L

REFER TO THE FOLLOWING.
(F1) -SUPER MULTIPLE
JUNCTION (SMJ)

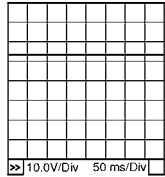
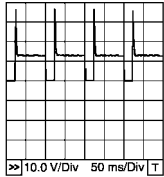
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	LG	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  10.0V/Div 50 ms/Div PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  10.0 V/Div 50 ms/Div PBIB0520E

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

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITHOUT EURO-OBD)]

EBS00OQP

Diagnostic Procedure

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Turn ignition switch "ON", and select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
4. Start engine and let it idle.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0569E

5. Change the valve opening percentage with touching "Qu" or "Qd" on CONSULT-II screen, and check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions	Vacuum
At idle	Should not exist.
Engine speed is about 2,000 rpm.	Should exist.

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Start engine and let it idle for at least 80 seconds.
4. Check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions	Vacuum
At idle	Should not exist.
Engine speed is about 2,000 rpm.	Should exist.

OK or NG

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

2. CHECK EVAP CANISTER

Refer to [EC-734, "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-731, "EVAPORATIVE EMISSION SYSTEM"](#) .

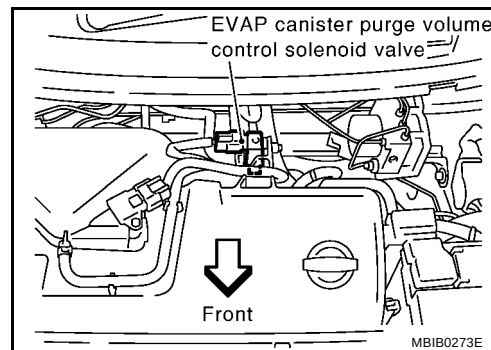
OK or NG

- OK >> GO TO 4.
NG >> Repair or reconnect the hose.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITHOUT EURO-OBID)]

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 harness connector.
3. Turn ignition switch "ON".

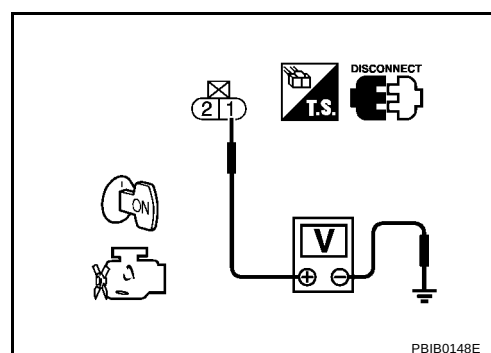


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- 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.

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 19 and EVAP canister purge volume 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 (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITHOUT EURO-OBD)]

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0569E

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-697, "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-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

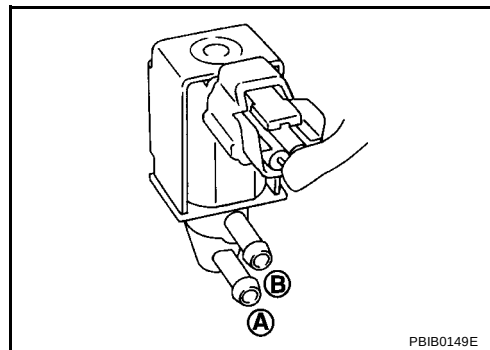
Component Inspection EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

EBS000QQ

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

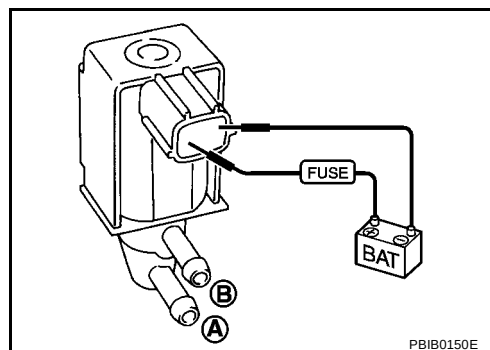
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No



Without CONSULT-II

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



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [CR (WITHOUT EURO-OBD)]

Removal and Installation

EBS00OQR

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-14, "AIR CLEANER AND AIR DUCT"](#) .

VSS

PFP:32702

Description

EBS000SW

The vehicle speed signal is sent to the combination meter from the ABS actuator and electric unit (control unit) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

Diagnostic Procedure

EBS000SX

1. INSPECTION START

Do you have CONSULT-II?

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-II.
5. Select "VHCL SPEED SE" indication when rotating wheels with suitable gear position.

"VHCL SPEED SE" indication should exceed 10km/h (6MPH).

OK or NG

- OK >> **INSPECTION END.**
NG >> GO TO 3.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

PBIB0164E

3. CHECK DTC

Refer to [BRC-6. "TROUBLE DIAGNOSIS"](#) .

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK COMBINATION METER

Check combination meter function.

Refer to [DI-5. "COMBINATION METERS"](#) .

>> INSPECTION END

IVT CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

IVT CONTROL SOLENOID VALVE

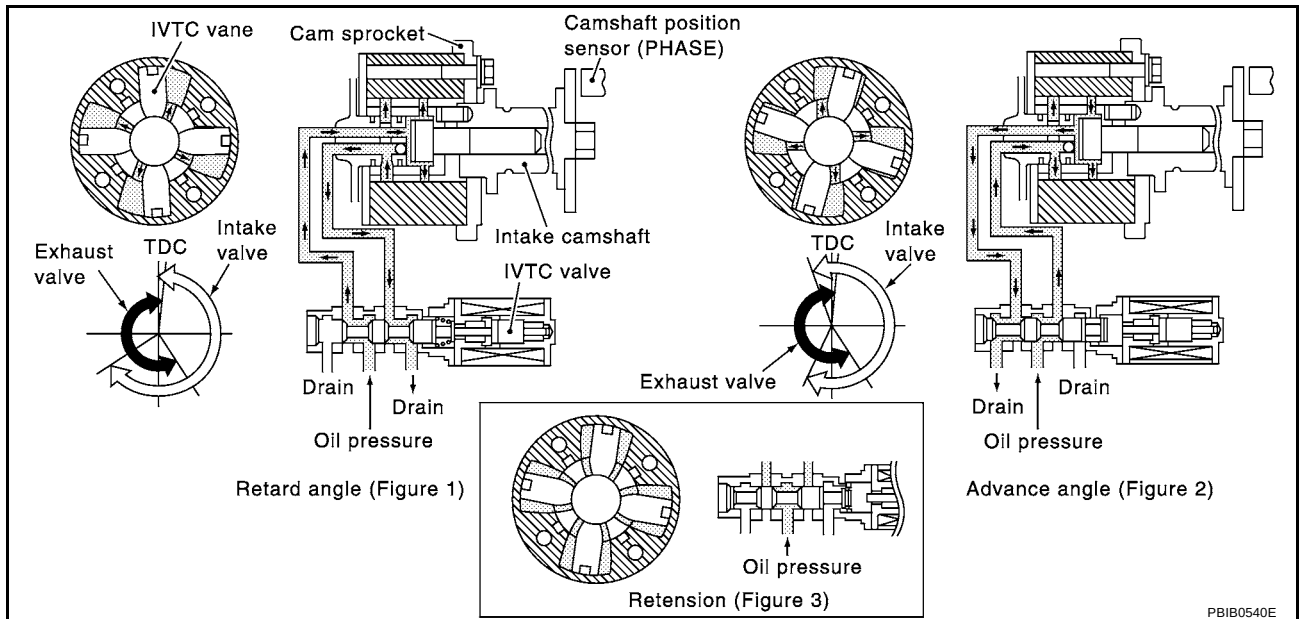
PFP:23796

Description SYSTEM DESCRIPTION

EBS000QS

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

COMPONENT DESCRIPTION

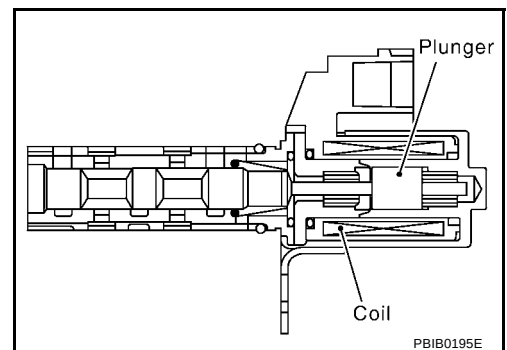
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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.



IVT CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

CONSULT-II Reference Value in Data Monitor Mode

EBS000OQT

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	-5° - 5°C
		When revving up to 2,000 rpm quickly	Approx. 0° - 20°C
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving up to 2,000 rpm quickly	Approx. 0% - 50%

A

EC

C

D

E

F

G

H

I

J

K

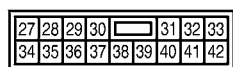
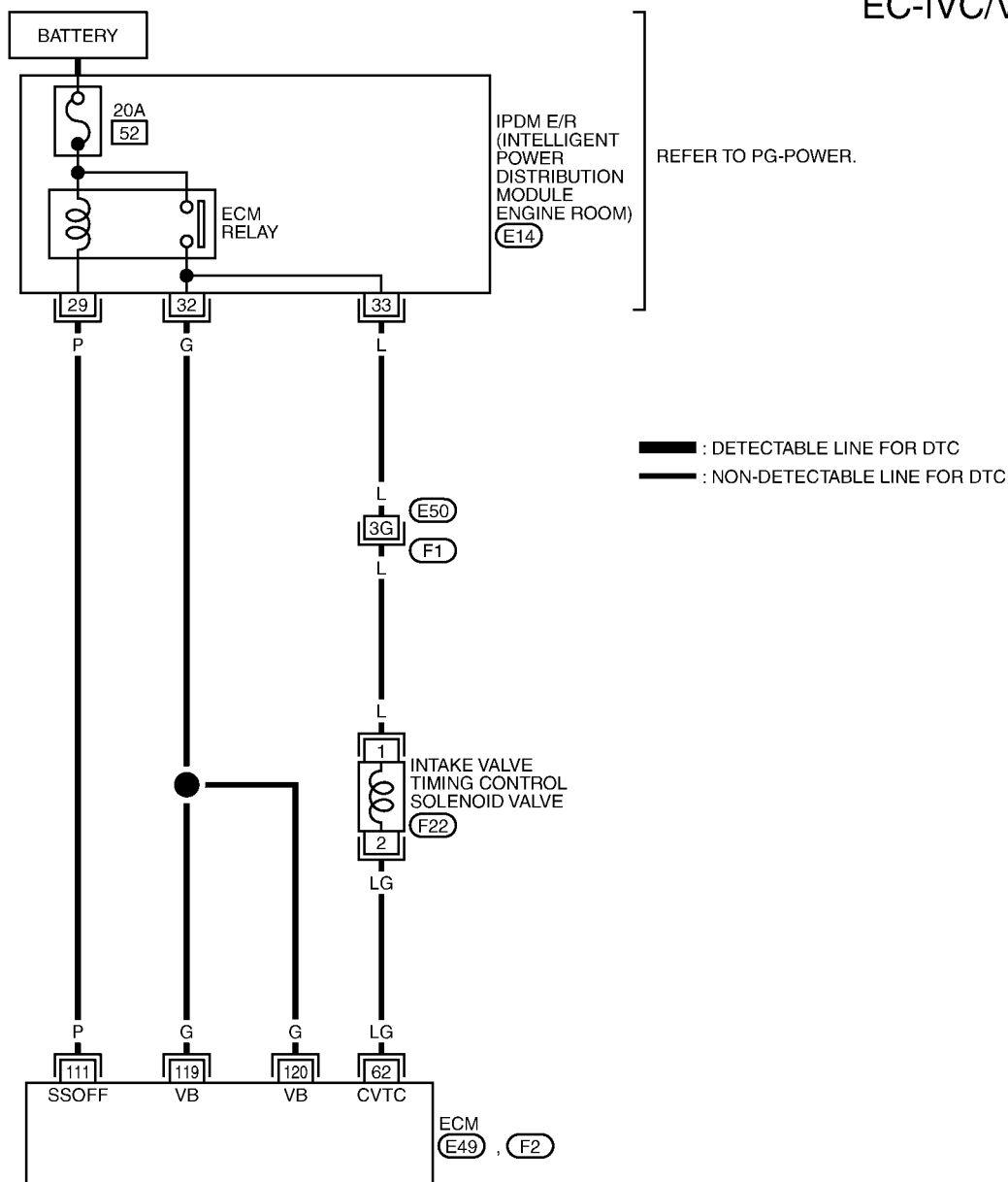
L

M

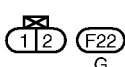
[CR (WITHOUT EURO-OBD)]

EBS000OU

REFER TO PG-POWER.

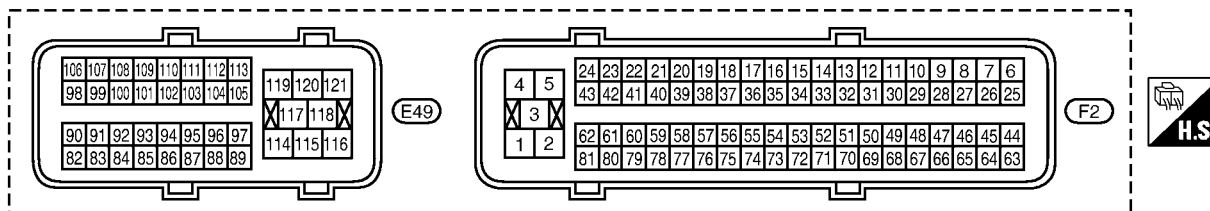


E14
W



REFER TO THE FOLLOWING.

F1 -SUPER MULTIPLE
JUNCTION (SMJ)



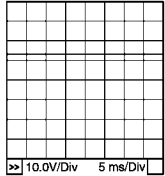
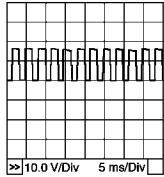
IVT CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	LG	Intake valve timing control solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)  MBIB0052E
			[Engine is running] ● Warm-up condition ● When revving engine up to 2,000 rpm quickly	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB0532E

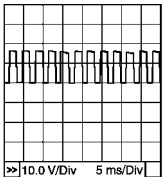
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS000QV

1. CHECK OVERALL FUNCTION CHECK

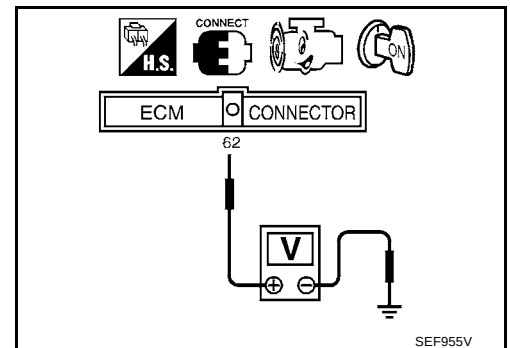
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Turn ignition switch "ON".
4. Set the tester probe between ECM terminals 62 (IVT control solenoid valve signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
Verify that the oscilloscope screen shows the signal wave as shown below.

Conditions	Voltage
At idle	BATTERY VOLTAGE (11 - 14V)
When revving engine up to 2,000 rpm quickly	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB0532E

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

OK or NG

- OK >> INSPECTION END
NG >> GO TO 2.

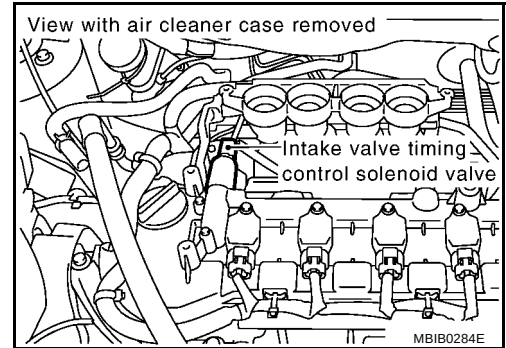


IVT CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch "ON".

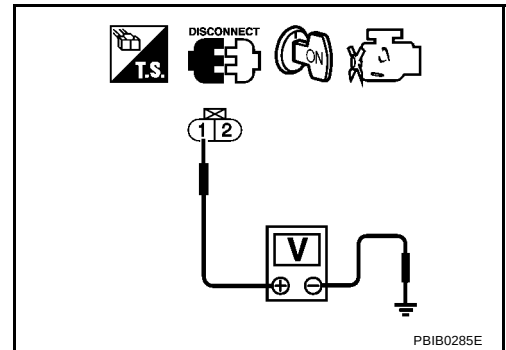


4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- IPDM E/R harness connector E14
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

4. 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 62 and intake valve timing 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 5.
- NG >> 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.

IVT CONTROL SOLENOID VALVE

[CR (WITHOUT EURO-OBD)]

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-575, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 7.
- NG >> Replace crankshaft position sensor (POS).

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-582, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 8.
- NG >> Replace camshaft position sensor (PHASE).

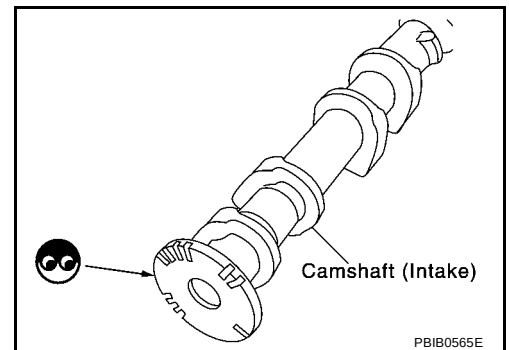
8. CHECK CAMSHAFT (INTAKE)

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 9.
- NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

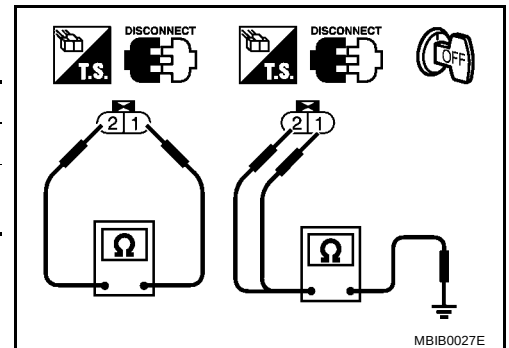
>> INSPECTION END

Component Inspection

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 terminals 1 and 2 under the following conditions.

Terminals	Resistance
1 and 2	Approximately 7.2Ω at 20°C (68°F)
1 or 2 and ground	$\infty\Omega$ (Continuity should not exist)



Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-31, "ROCKER COVER"](#) .

PNP SWITCH

PFP:32006

Component Description

EBS000QY

When the shift lever position is "P" or "N" (A/T models) or "Neutral" (M/T models), park/neutral position (PNP) switch is "ON".

ECM detects the position because the continuity of the line (the "ON" signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

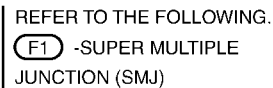
EBS000QZ

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

[CR (WITHOUT EURO-OBD)]

EBS00OR0



PNP SWITCH

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	GY	PNP switch	[Ignition switch "ON"] ● Shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE

Diagnostic Procedure

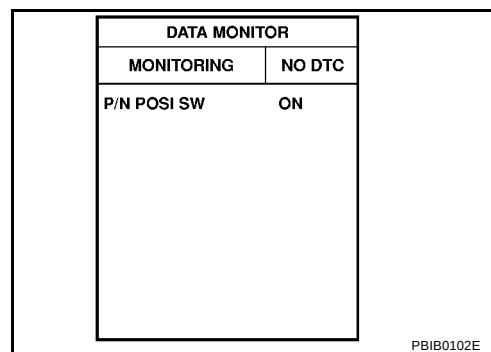
EBS000R1

1. CHECK OVERALL FUNCTION

With CONSULT-II

- Turn ignition switch "ON".
- Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II.
- Check the "P/N POSI SW" signal under the following conditions.

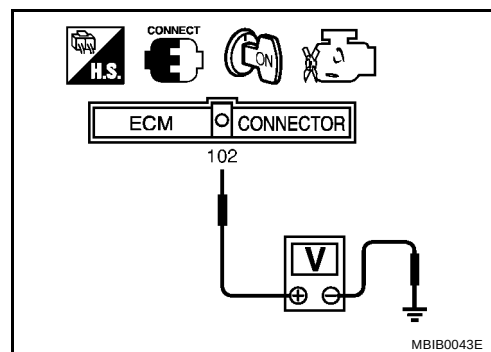
Selector lever position	P/N POSI SW signal
"P" and "N" (A/T models), "Neutral" (M/T models) position	ON
Except the above position	OFF



Without CONSULT-II

- Turn ignition switch "ON".
- Check voltage between ECM terminal 102 and ground under the following conditions.

Selector lever position	Voltage
"P" and "N" (A/T models), "Neutral" (M/T models) position	Approximately 0V
Except the above position	Battery voltage



OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.

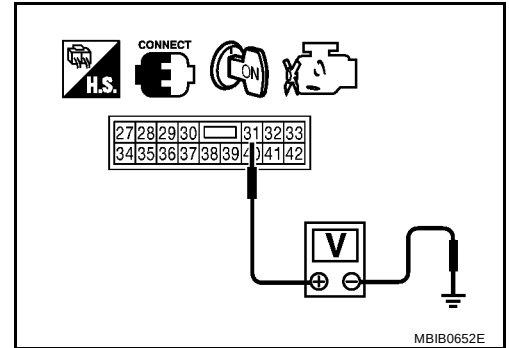
2. CHECK PNP SWITCH CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between IPDM E/R terminal 31 and ground under following condition.

Shift lever position	Voltage
"P" or "N" (A/T models) Neutral (M/T models)	Battery voltage (11- 14V)
Except above position	Approximately 0V

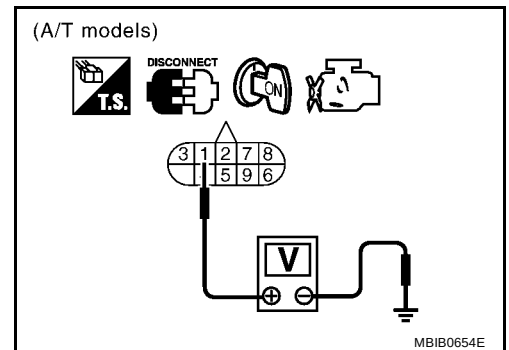
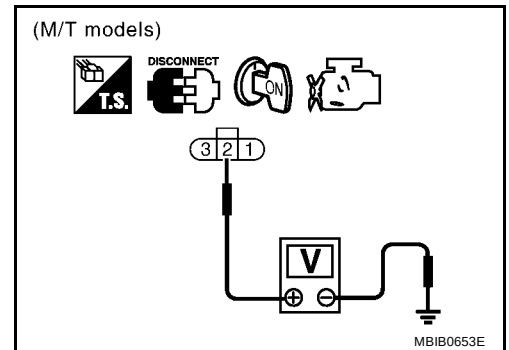
OK or NG

- OK >> GO TO 8.
NG >> GO TO 3.



3. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Connect IPDM E/R harness connector.
3. Disconnect PNP switch harness connector.
4. Turn ignition switch "ON".
5. Check voltage between PNP switch terminal 1(A/T models), 2(M/T models) and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PARTS

Check the following.

- 10A fuse
- Harness connectors E50, F1
- IPDM E/R connector E14
- Harness for short or open between PNP switch and fuse

>> Repair or replace harness or connectors.

5. CHECK HARNESS CONTINUITY BETWEEN PNP SWITCH AND IPDM E/R

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E14.
3. Check harness continuity between IPDM E/R terminal 31 and PNP switch terminal 2(A/T models), 3(M/T models).

Continuity should exist.

OK or NG

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

6. DETECT MALFUNCTIONING PARTS

Check the following.

- Harness connectors E50,F1
- Harness for short or open between PNP switch and IPDM E/R

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

7. CHECK PNP SWITCH

Refer to [AT-354, "COMPONENT INSPECTION"](#) (A/T models) or [MT-8, "POSITION SWITCH"](#) (M/T models).

OK or NG

- OK >> GO TO 9.
NG >> Replace PNP switch.

8. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E17
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 102 and IPDM E/R terminal 64.

Continuity should 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 INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

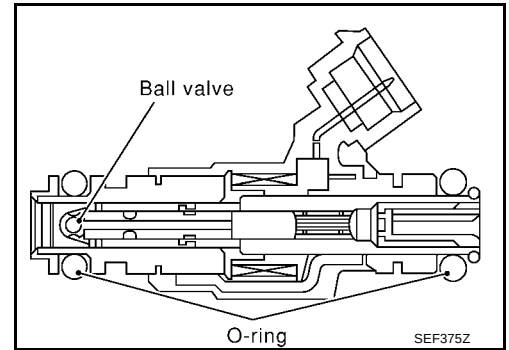
INJECTOR CIRCUIT

PPF:16600

Component Description

EBS000R2

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

EBS000R3

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.5 - 3.5 msec
		2,000 rpm	2.5 - 3.5 msec
INJ PULSE-B1	● Engine: After warming up ● Shift lever: 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

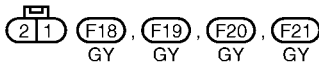
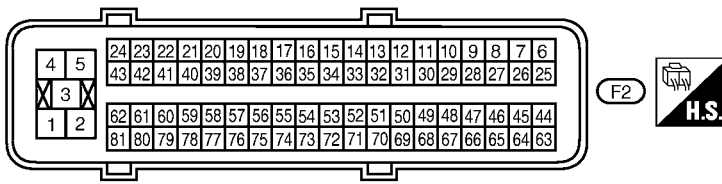
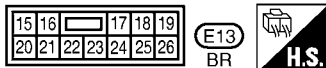
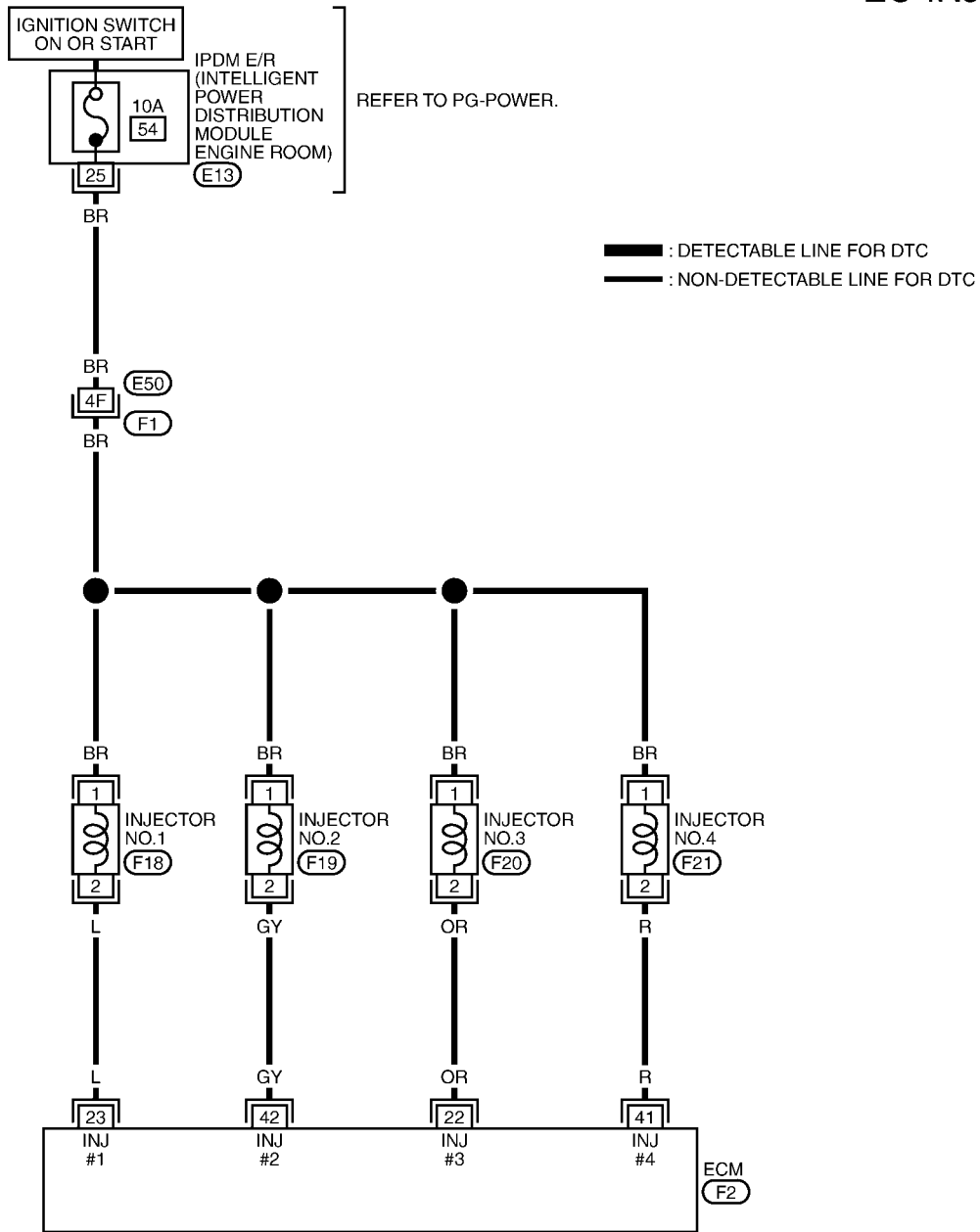
INJECTOR CIRCUIT

[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS000R4

EC-INJECT-01



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

MBWA0298E

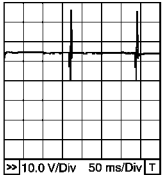
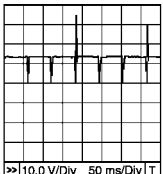
INJECTOR CIRCUIT

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	OR L R GY	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

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

Diagnostic Procedure

EBS000R5

1. INSPECTION START

Turn ignition switch to "START".

Is any cylinder ignited?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

2. CHECK OVERALL FUNCTION

④ With CONSULT-II

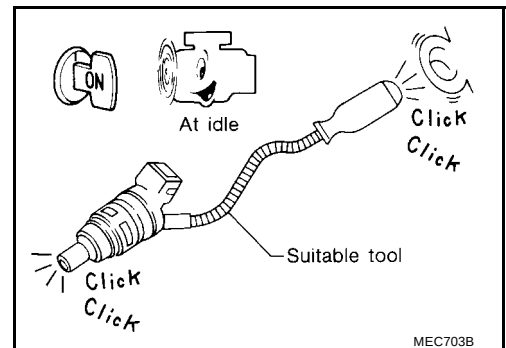
1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm

MBIB0302E

⊗ Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
Clicking noise should be heard.

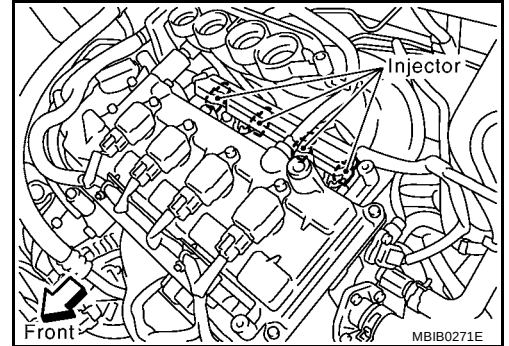


OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".

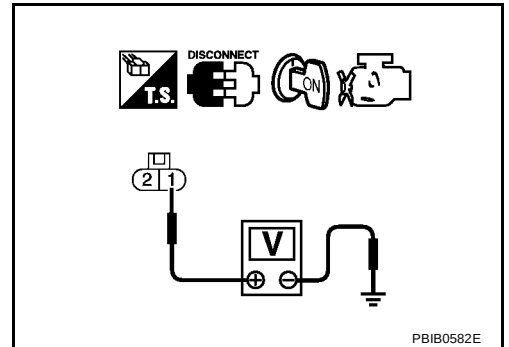


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK	>> GO TO 5.
NG	>> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E50
- IPDM E/R connector E13
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. 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.

6. CHECK INJECTOR

Refer to [EC-716, "Component Inspection"](#).

OK or NG

OK	>> GO TO 7.
NG	>> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

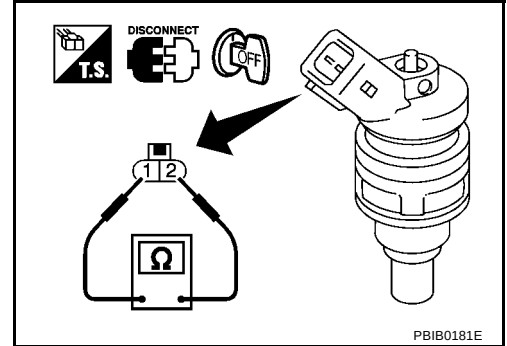
>> INSPECTION END

Component Inspection INJECTOR

EBS000R6

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 12.1 - 12.9Ω [at 20°C (68°F)]



EBS000R7

Removal and Installation INJECTOR

Refer to [EM-28, "FUEL INJECTOR AND FUEL TUBE"](#) .

FUEL PUMP CIRCUIT

[CR (WITHOUT EURO-OBD)]

FUEL PUMP CIRCUIT

PFP:17042

Description SYSTEM DESCRIPTION

EBS000R8

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*		

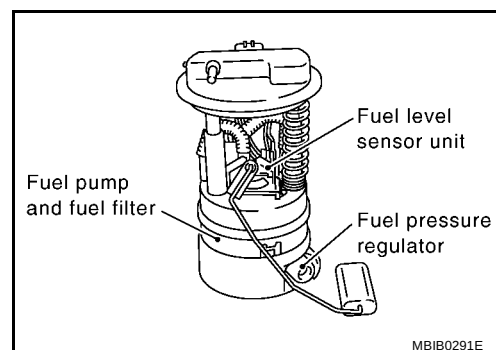
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS000R9

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON	ON
	● Engine running or cranking	
	● Except above conditions	OFF

FUEL PUMP CIRCUIT

[CR (WITHOUT EURO-OBD)]

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-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	R	Fuel pump relay	[Ignition switch "ON"] ● For 1 seconds after turning ignition switch "ON"	0 - 1.0V
			[Engine is running] [Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

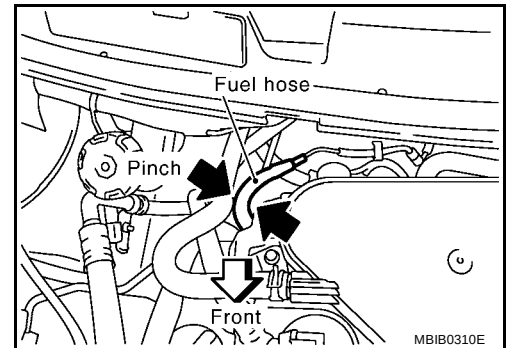
EBS000RB

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with two fingers.
Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned "ON".

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



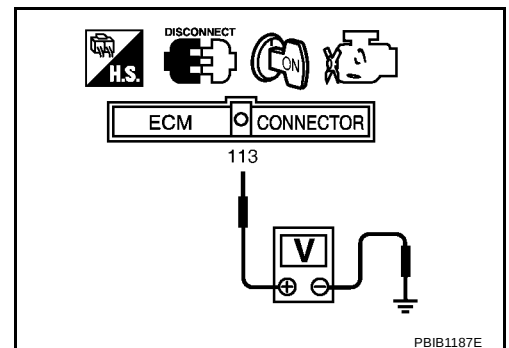
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ECM terminals 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



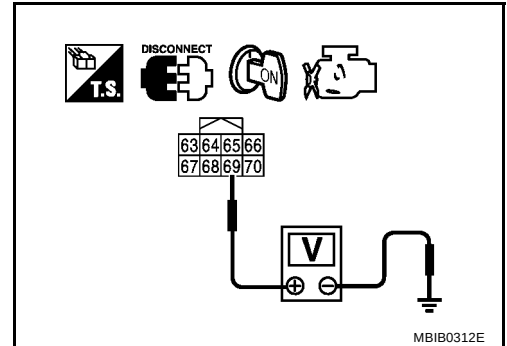
3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect IPDM E/R harness connector E17.
3. Turn ignition switch "ON".
4. Check voltage between IPDM E/R terminal 69 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 9.



4. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector E17
- Harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

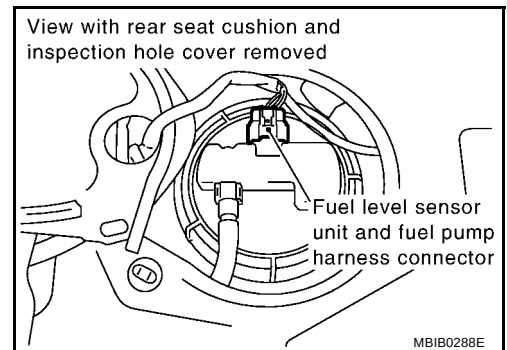
1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between terminal 20 of IPDM E/R connector E13 and fuel level sensor unit and fuel pump terminal 1, fuel level sensor unit and fuel pump terminal 3 and body ground. Refer to 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 M1, E101
- Harness connectors B1, M10
- Harness for open or short between fuel level sensor unit and fuel pump and IPDM E/R
- Harness for open or short between fuel level sensor unit and fuel pump and body ground

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

7. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and terminal 69 of IPDM E/R connector E17.
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 or short between ECM and IPDM E/R.

8. CHECK FUEL PUMP

Refer to [EC-721, "Component Inspection"](#) .

OK or NG

OK >> GO TO 9.

NG >> Replace fuel pump.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

OK >> Replace IPDM E/R

NG >> Repair or replace harness or connector

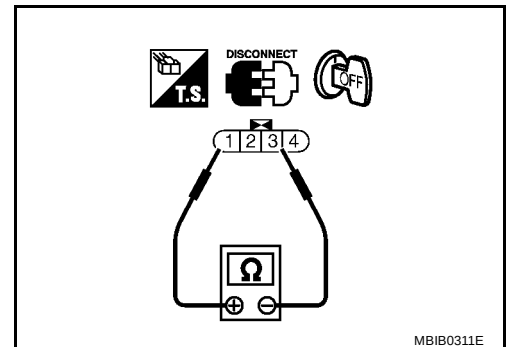
>> **INSPECTION END**

Component Inspection FUEL PUMP

EBS000RC

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 1.0Ω [at 25°C (77°F)]



EBS000ORD

Removal and Installation FUEL PUMP

Refer to [FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY"](#) .

REFRIGERANT PRESSURE SENSOR

[CR (WITHOUT EURO-OBD)]

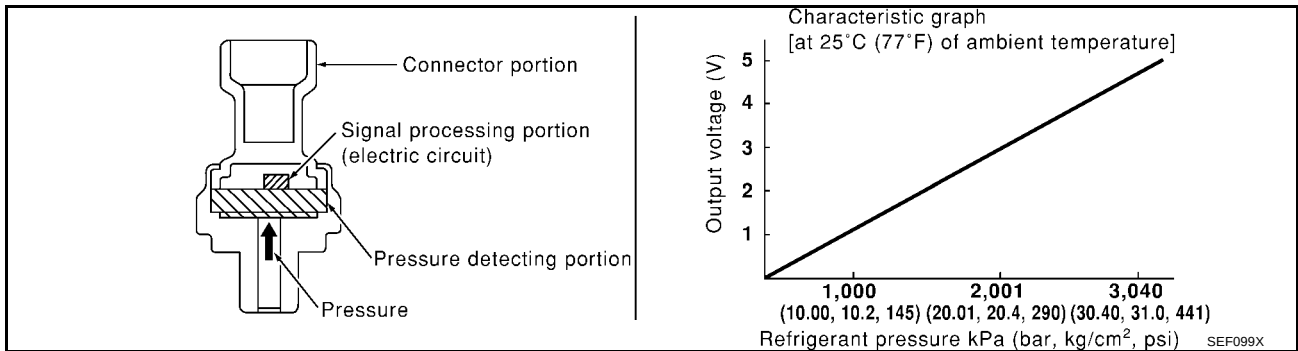
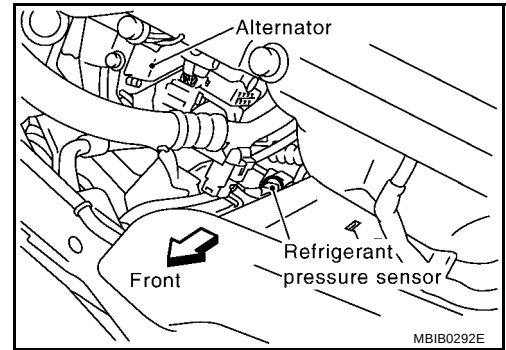
REFRIGERANT PRESSURE SENSOR

PFP:92136

Component Description

EBS000RE

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, and ECM controls cooling fan system.



[CR (WITHOUT EURO-OBD)]

Wiring Diagram

EBS00ORF

EC-RP/SEN-01

A

EC

C

D

E

F

G

H

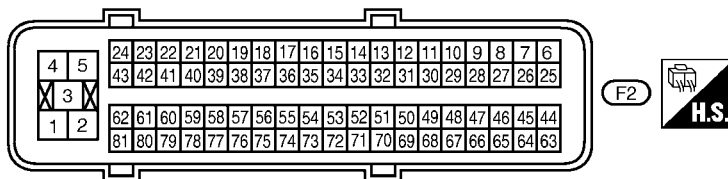
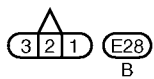
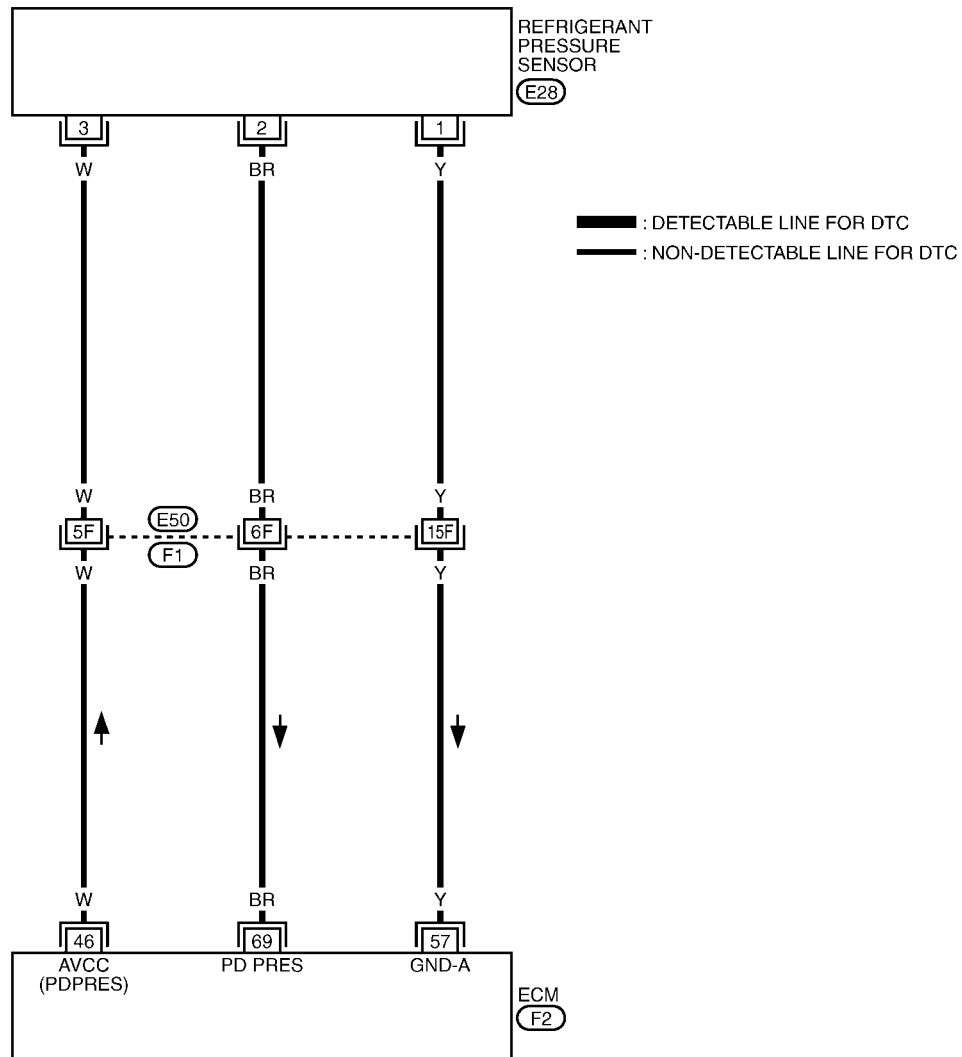
1

J

K

L

M



REFER TO THE FOLLOWING.

(F1) -SUPER MULTIPLE JUNCTION (SMJ)

REFRIGERANT PRESSURE SENSOR

[CR (WITHOUT EURO-OBD)]

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Sensor's ground (Refrigerant pressure sensor)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
46	W	Sensor's power supply (Refrigerant pressure sensor)	[Ignition switch "ON"]	Approximately 5V
69	BR	Refrigerant pressure sensor	[Engine is running] ● Warm-up condition ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V

Diagnostic Procedure

EBS000RG

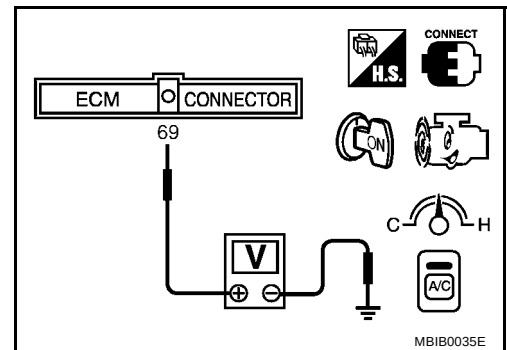
1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

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 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

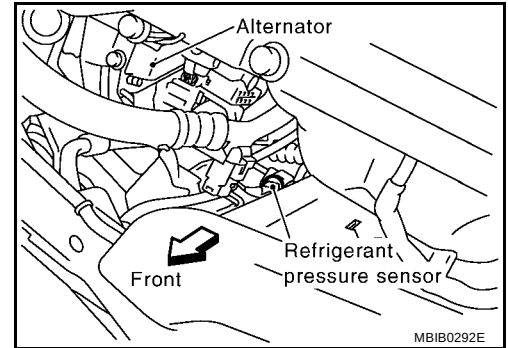


REFRIGERANT PRESSURE SENSOR

[CR (WITHOUT EURO-OBD)]

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch "OFF".
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch "ON".

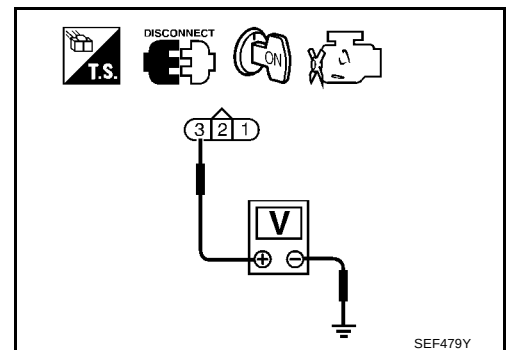


5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

4. 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 ECM terminal 57 and refrigerant pressure sensor 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- 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.

REFRIGERANT PRESSURE SENSOR

[CR (WITHOUT EURO-OBD)]

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 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

OK >> GO TO 8.

NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E50, F1
- 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.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-499, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

OK or NG

OK >> Replace refrigerant pressure sensor.

NG >> Repair or replace.

Removal and Installation

REFRIGERANT PRESSURE SENSOR

EBS000RH

Refer to [ATC-7, "REFRIGERATION SYSTEM"](#) (Automatic air conditioner models) or [MTC-14, "REFRIGERATION SYSTEM"](#) (Manual air conditioner models).

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

EBS000RI

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from IPDM E/R to ECM.

CONSULT-II Reference Value in Data Monitor Mode

EBS000RJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF

Diagnostic Procedure

EBS000RK

1. INSECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.

No >> GO TO 6.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch "ON".
2. Connect CONSULT-II and select "DATA MONITOR" mode.
3. 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 3.

NG >> GO TO 4.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

3. 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 >> INSPECTION END

NG >> GO TO 5.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-14, "REAR WINDOW DEFOGGER"](#).

>> INSPECTION END

5. CHECK HEADLAMP SYSTEM

Refer to [LT-5, "HEADLAMP -CONVENTIONAL TYPE-"](#) or [LT-32, "HEADLAMP - DAYTIME LIGHT SYSTEM -"](#) .

>> INSPECTION END

6. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-14, "REAR WINDOW DEFOGGER"](#) .

OK or NG

OK >> GO TO 7.

NG >> Repair or replace

7. CHECK HEADLAMP SYSTEM

Refer to [LT-5, "HEADLAMP -CONVENTIONAL TYPE-"](#) or [LT-32, "HEADLAMP - DAYTIME LIGHT SYSTEM -"](#) .

>> INSPECTION END

MI & DATA LINK CONNECTORS

[CR (WITHOUT EURO-OBD)]

MI & DATA LINK CONNECTORS

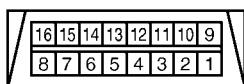
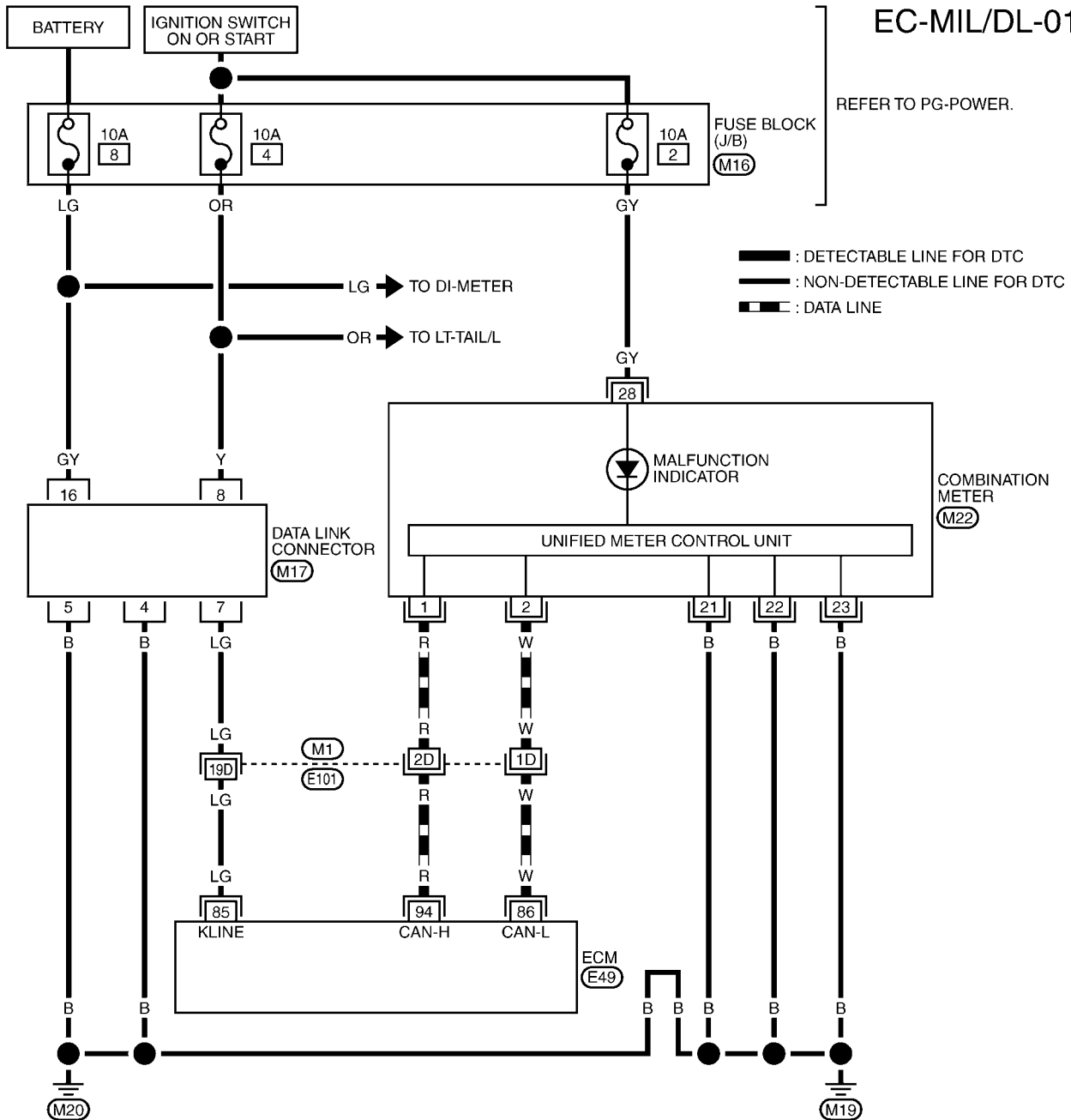
PFP:24814

Wiring Diagram (LHD Models)

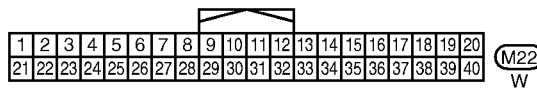
EBS000RL

EC-MIL/DL-01

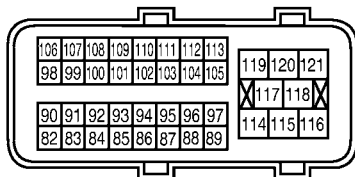
REFER TO PG-POWER.



(M17)
W



(M22)
W



(E49)



REFER TO THE FOLLOWING.

- (M1) -SUPER MULTIPLE JUNCTION (SMJ)
- (M16) -FUSE BLOCK
- JUNCTION BOX (J/B)

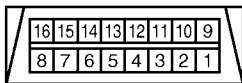
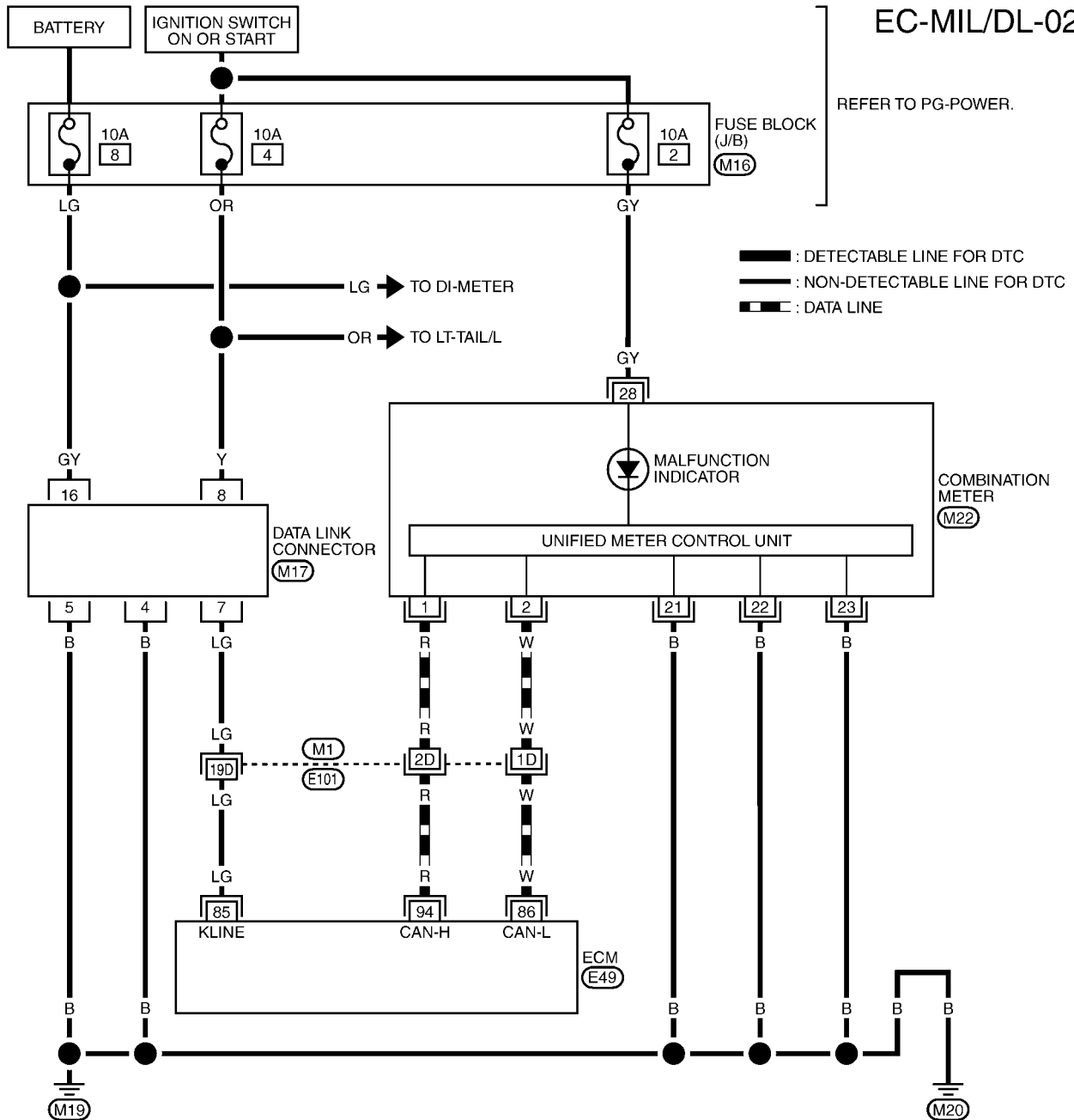
MBWA0301E

MI & DATA LINK CONNECTORS

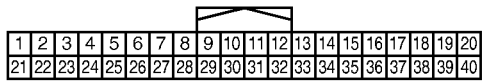
[CR (WITHOUT EURO-OBD)]

EBS00ORM

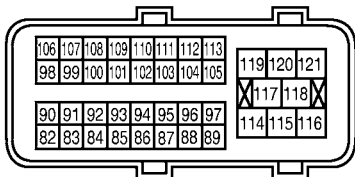
Wiring Diagram (RHD Models)



(M17)
W



(M22)
W



(E49)



REFER TO THE FOLLOWING.

(M1) -SUPER MULTIPLE JUNCTION (SMJ)

(M16) -FUSE BLOCK -JUNCTION BOX (J/B)

MBWA0302E

EVAPORATIVE EMISSION SYSTEM

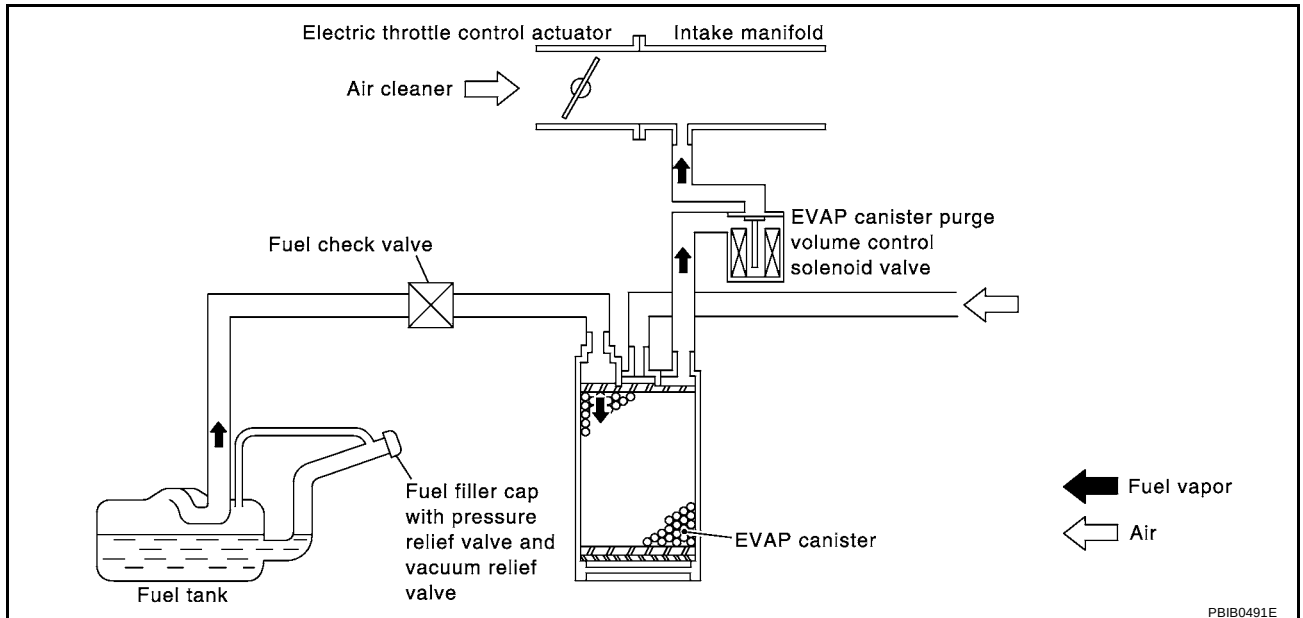
[CR (WITHOUT EURO-OBD)]

EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description SYSTEM DESCRIPTION

EBS000RN



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.

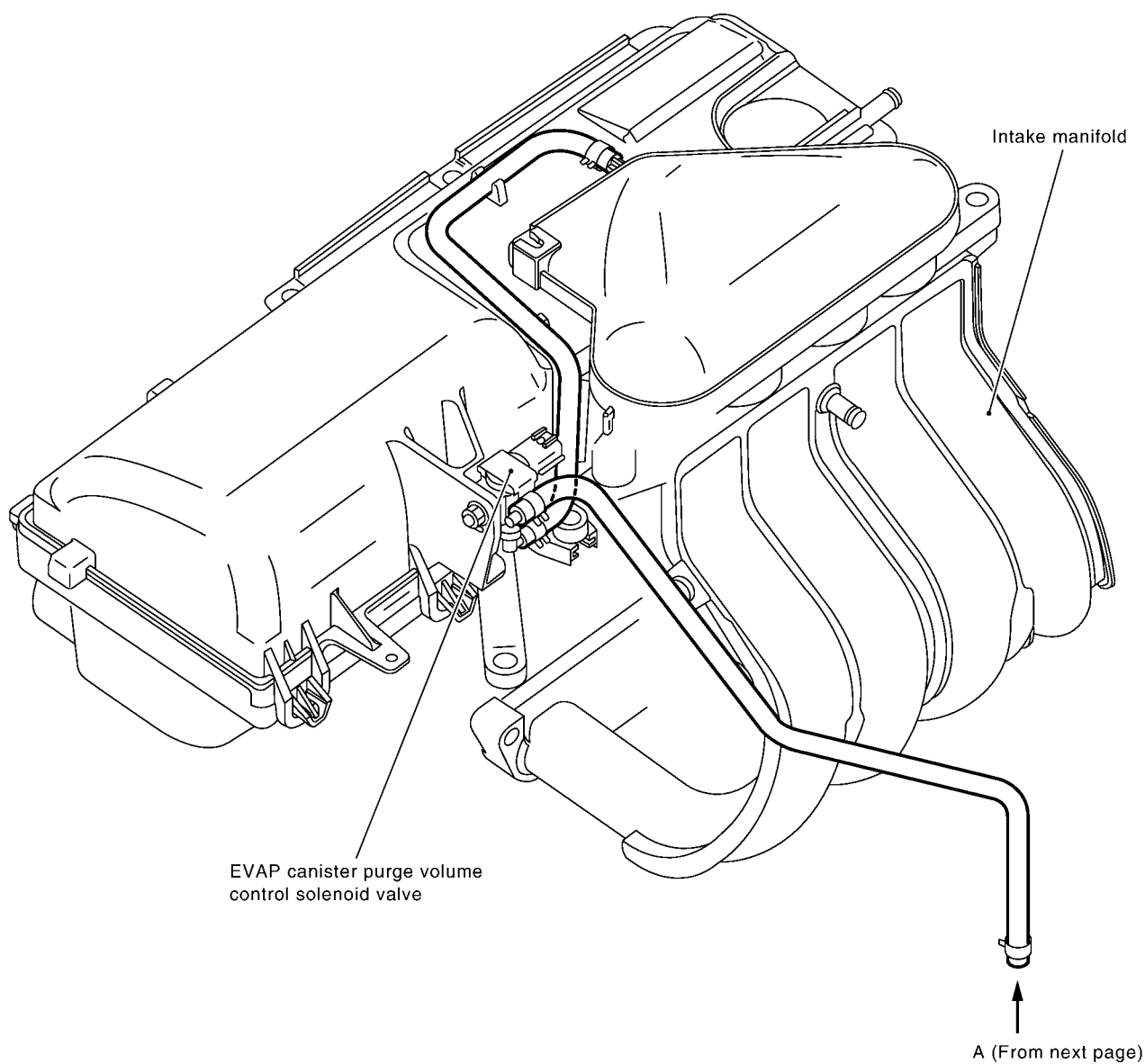
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

[CR (WITHOUT EURO-OBD)]

EVAPORATIVE EMISSION LINE DRAWING



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

MBIB0544E

EVAPORATIVE EMISSION SYSTEM

[CR (WITHOUT EURO-OBD)]

A

EC

C

D

E

F

G

H

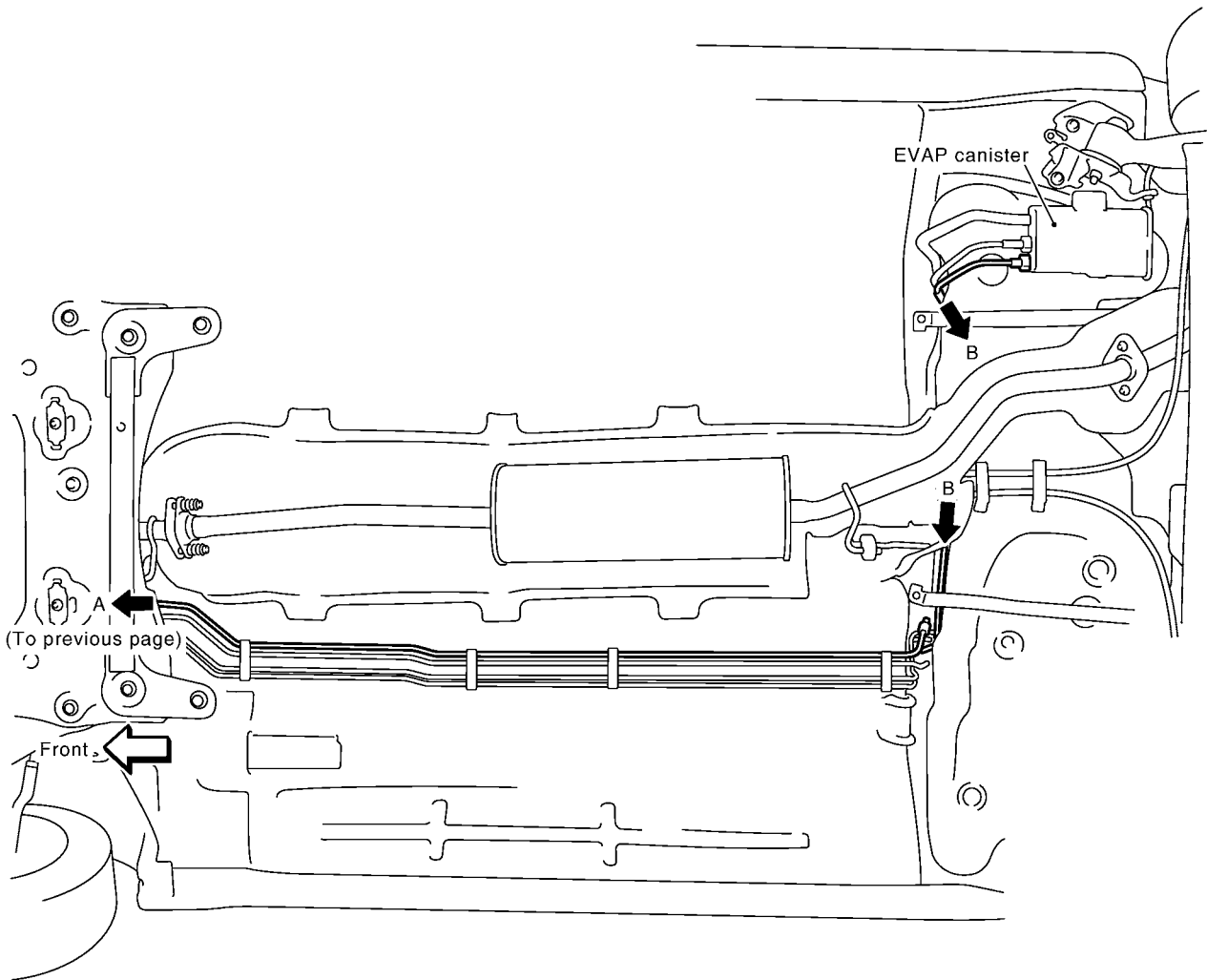
I

J

K

L

M



MBIB0541E

EVAPORATIVE EMISSION SYSTEM

[CR (WITHOUT EURO-OBD)]

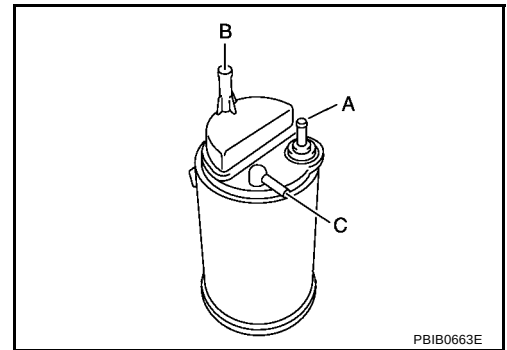
EBS000RO

Component Inspection

EVAP CANISTER

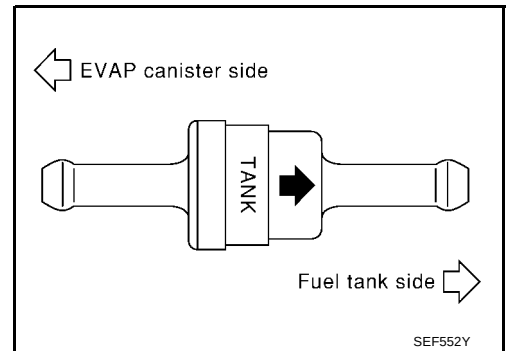
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** .
Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** .
Check that air flows freely through port **C** .



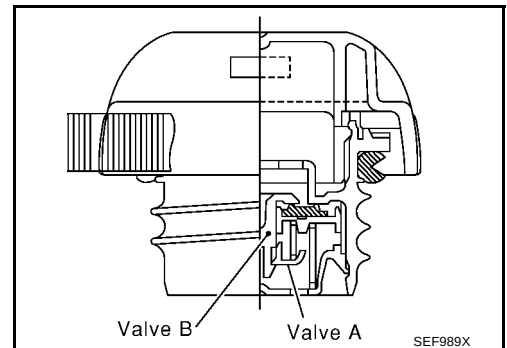
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



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

1. Wipe clean valve housing.

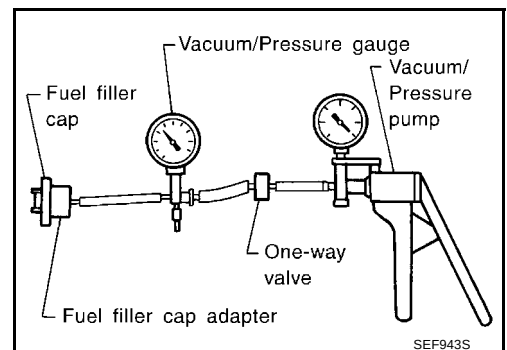


2. Check valve opening pressure and vacuum.

**Pres-
sure:** 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 -3.4 kPa (-0.060 to -0.034 bar,
-0.061 to -0.035 kg/cm² , -0.87 to -0.49 psi)

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



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-697, "Component Inspection"](#) .

POSITIVE CRANKCASE VENTILATION

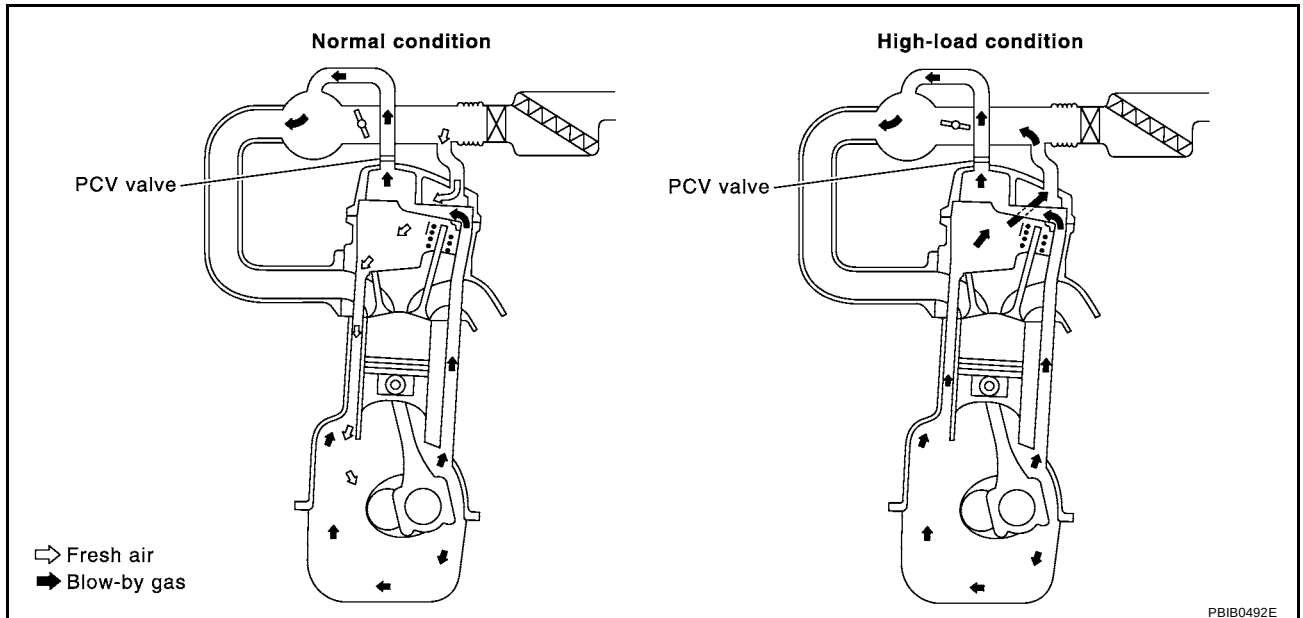
[CR (WITHOUT EURO-OBD)]

POSITIVE CRANKCASE VENTILATION

PFP:11810

Description SYSTEM DESCRIPTION

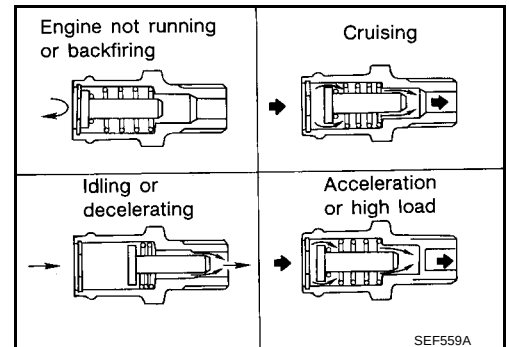
EBS000RP



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.

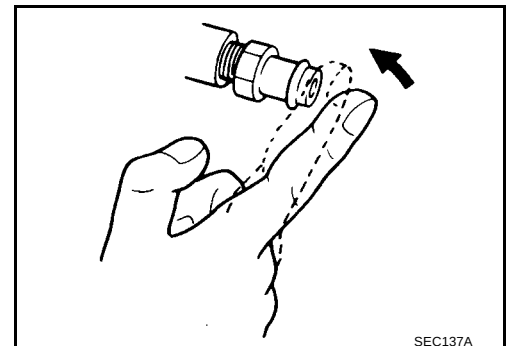
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection PCV (POSITIVE CRANKCASE VENTILATION) VALVE

EBS000RQ

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.

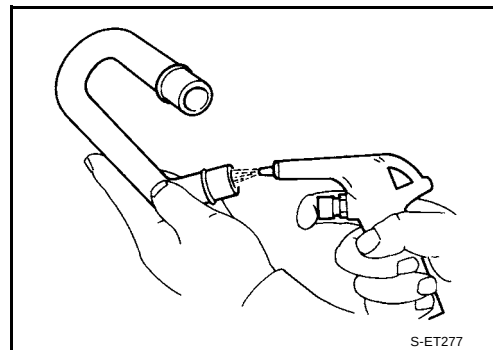


POSITIVE CRANKCASE VENTILATION

[CR (WITHOUT EURO-OBD)]

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.



SERVICE DATA AND SPECIFICATIONS (SDS)

[CR (WITHOUT EURO-OBD)]

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

EBS000RR

Fuel pressure at idle	Approximately 350 kPa (3.5bar, 3.57kg/cm ² , 51psi)

Idle Speed and Ignition Timing

EBS000RS

Target idle speed	No-load*1 (in "P" or N" position)	M/T: 650±50 rpm A/T: 700±50 rpm
Ignition timing	In "P" or N" position	5°±5° BTDC

*1: 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

EBS000RT

	Calculated load value% (Using CONSULT-II)
At idle	10 - 35
At 2,500 rpm	10 - 35

Manifold absolute pressure sensor

EBS000RU

Supply voltage	Approximately 5.0V
Output voltage at idle	1.4 - 1.5V*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

EBS000RV

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

EBS000RW

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

Heated Oxygen Sensor 1 Heater

EBS000RX

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Heated Oxygen sensor 2 Heater

EBS000RY

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Crankshaft Position Sensor (POS)

EBS000RZ

Refer to [EC-575, "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

EBS000S0

Refer to [EC-582, "Component Inspection"](#).

Throttle Control Motor

EBS000S1

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

SERVICE DATA AND SPECIFICATIONS (SDS)
[CR (WITHOUT EURO-OBD)]

Injector

EBS000S2

Resistance [at 20°C (68°F)]	12.1 - 12.9Ω

Fuel Pump

EBS000S3

Resistance [at 25°C (77°F)]	Approximately 1.0Ω