SECTION EC
ENGINE CONTROL SYSTEM

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MODIFICATION NOTICE

PFP:00000

Modification Notice

EBS00HVV

2-step modifications have been adopted.

FIRST STEP

- On Board Diagnoses Logic for some DTCs have been changed.

SECOND STEP

- Control conditions for VIAS control solenoid valve have been changed.

How to Check Vehicle Type

EBS00HVW

Check the Calibration ID using CONSULT-II or GST and confirm the type of the vehicle.

Vehicle Type	Calibration ID
Type I (Initial products)	1AR200
Type II (First step)	1AR201
Type III (Second step)	1AR202 ~

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PFP:00024

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EBS002NJ

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-151 .

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	CONSULT-II GST*2	ECM*3	
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A/T DIAG COMM LINE	P1605	1605	EC-554
A/T INTERLOCK	P1730	1730	AT-129
A/T TCC S/V FNCTN	P0744	0744	AT-97
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FUEL LEV SEN SLOSH	P0460	0460	EC-389
FUEL SYS-LEAN/BK1	P0171	0171	EC-301
FUEL SYS-LEAN/BK2	P0174	0174	EC-301
FUEL SYS-RICH/BK1	P0172	0172	EC-309
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HO2S1 (B1)	P0134	0134	EC-232
HO2S1 (B2)	P0150	0150	EC-197
HO2S1 (B2)	P0151	0151	EC-207
HO2S1 (B2)	P0152	0152	EC-213
HO2S1 (B2)	P0153	0153	EC-220
HO2S1 (B2)	P0154	0154	EC-232
HO2S1 HTR (B1)	P0135	0135	EC-241
HO2S1 HTR (B2)	P0155	0155	EC-241
HO2S2 HTR (B1)	P0141	0141	EC-293
HO2S2 HTR (B2)	P0161	0161	EC-293
HO2S2 (B1)	P0137	0137	EC-249
HO2S2 (B1)	P0138	0138	EC-260
HO2S2 (B1)	P0139	0139	EC-271
HO2S2 (B1)	P0140	0140	EC-282
HO2S2 (B2)	P0157	0157	EC-249
HO2S2 (B2)	P0158	0158	EC-260
HO2S2 (B2)	P0159	0159	EC-271
HO2S2 (B2)	P0160	0160	EC-282
I/C SOLENOID FNCTN	P1754	1754	AT-141
I/C SOLENOID/CIRC	P1752	1752	AT-138
IGN SIGNAL-PRIMARY	P1320	1320	EC-479
INT/V TIM CONT-B1	P1110	1110	EC-420

INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
INT/V TIM CONT-B2	P1135	1135	EC-420
INT/V TIM V/CIR-B1	P1111	1111	EC-429
INT/V TIM V/CIR-B2	P1136	1136	EC-429
INTK TIM S/CIRC-B1	P1140	1140	EC-452
INTK TIM S/CIRC-B2	P1145	1145	EC-452
ISC SYSTEM/FNCTN	P0505	0505	EC-402
KNOCK SEN/CIRC-B1	P0325	0325	EC-327
KNOCK SEN/CIRC-B2	P0330	0330	EC-327
L/PRESS SOL/CIRC	P0745	0745	AT-101
LC/B SOLENOID FNCT	P1774	1774	AT-165
LC/B SOLENOID/CIRC	P1772	1772	AT-162
MAF SEN/CIRCUIT*5	P0100	0100	EC-154
MIL/CIRC	P0650	0650	EC-412
MULTI CYL MISFIRE	P0300	0300	EC-321
NATS MALFUNCTION*8	P1610 - P1615	1610 - 1615	BL-146
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	EC-66
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**
P-N POS SW/CIRCUIT	P1706	1706	EC-555
PNP SW/CIRC	P0705	0705	AT-85
PURG VOLUME CONT/V	P0443	0443	EC-360
PURG VOLUME CONT/V	P1444	1444	EC-500
PW ST P SEN/CIRC	P0550	0550	EC-404
RADI TEMP SEN/CIRC	P1119	1119	EC-435
SHIFT SIG FNCTN	P1780	1780	EC-563
TCC SOLENOID/CIRC	P0740	0740	AT-94
TCS C/U FUNCTN	P1211	1211	EC-462
TCS/CIRC	P1212	1212	EC-463
THRTL POS SEN/CIRC*7	P0120	0120	EC-178
TURBINE REV S/CIRC	P1716	1716	AT-123
TW CATALYST SYS-B1	P0420	0420	EC-346
TW CATALYST SYS-B2	P0430	0430	EC-346
V/SP SEN (A/T OUT)	P1720	1720	EC-561
VC CUT/V BYPASS/V	P1491	1491	EC-546
VC/V BYPASS/V	P1490	1490	EC-540
VEH SPD SEN/CIR AT	P0720	0720	AT-89
VEH SPEED SEN/CIRC	P0500	0500	EC-400
VENT CONTROL VALVE	P0446	0446	EC-366
VENT CONTROL VALVE	P1446	1446	EC-509
VENT CONTROL VALVE	P1448	1448	EC-522

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: When the fail-safe operation occurs, the MIL illuminates.
*6: The trouble shooting for this DTC needs CONSULT-II.
*7: For the type II or type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .), if the ECM detect a malfunction for this self-diagnosis, the DTC will be stoned even in a 1st trip.
*8: The MIL will not be illuminated for these DTCs with type II or type III vehicle.

NOTE:
Regarding F50 models, “B1” or “BK1” indicates bank 1, “B2” or “BK2” indicates bank 2.

DTC No. Index

EBS002NK

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-151 .

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
—	—	Unable to access ECM	EC-80
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	EC-66
U1000	1000*6	CAN COMM CIRCUIT	EC-151
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	0100	MAF SEN/CIRCUIT*5	EC-154
P0105	0105	ABSL PRES SEN/CIRC	EC-163
P0110	0110	AIR TEMP SEN/CIRC	EC-168
P0115	0115	COOLANT T SEN/CIRC*5	EC-173
P0120	0120	THRTL POS SEN/CIRC*7	EC-178
P0121	0121	ACCEL POS SEN/CIRC*7	EC-186
P0125	0125	*COOLAN T SEN/CIRC	EC-193
P0130	0130	HO2S1 (B1)	EC-197
P0131	0131	HO2S1 (B1)	EC-207
P0132	0132	HO2S1 (B1)	EC-213
P0133	0133	HO2S1 (B1)	EC-220
P0134	0134	HO2S1 (B1)	EC-232
P0135	0135	HO2S1 HTR (B1)	EC-241
P0137	0137	HO2S2 (B1)	EC-249
P0138	0138	HO2S2 (B1)	EC-260
P0139	0139	HO2S2 (B1)	EC-271
P0140	0140	HO2S2 (B1)	EC-282
P0141	0141	HO2S2 HTR (B1)	EC-293
P0150	0150	HO2S1 (B2)	EC-197
P0151	0151	HO2S1 (B2)	EC-207
P0152	0152	HO2S1 (B2)	EC-213
P0153	0153	HO2S1 (B2)	EC-220
P0154	0154	HO2S1 (B2)	EC-232

INDEX FOR DTC

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0155	0155	HO2S1 HTR (B2)	EC-241
P0157	0157	HO2S2 (B2)	EC-249
P0158	0158	HO2S2 (B2)	EC-260
P0159	0159	HO2S2 (B2)	EC-271
P0160	0160	HO2S2 (B2)	EC-282
P0161	0161	HO2S2 HTR (B2)	EC-293
P0171	0171	FUEL SYS-LEAN/BK1	EC-301
P0172	0172	FUEL SYS-RICH/BK1	EC-309
P0174	0174	FUEL SYS-LEAN/BK2	EC-301
P0175	0175	FUEL SYS-RICH/BK2	EC-309
P0180	0180	FUEL TEMP SEN/CIRC	EC-316
P0300	0300	MULTI CYL MISFIRE	EC-321
P0301	0301	CYL 1 MISFIRE	EC-321
P0302	0302	CYL 2 MISFIRE	EC-321
P0303	0303	CYL 3 MISFIRE	EC-321
P0304	0304	CYL 4 MISFIRE	EC-321
P0305	0305	CYL 5 MISFIRE	EC-321
P0306	0306	CYL 6 MISFIRE	EC-321
P0307	0307	CYL 7 MISFIRE	EC-321
P0308	0308	CYL 8 MISFIRE	EC-321
P0325	0325	KNOCK SEN/CIRC-B1	EC-327
P0330	0330	KNOCK SEN/CIRC-B2	EC-327
P0335	0335	CKP SEN/CIRCUIT	EC-331
P0340	0340	CMP SEN/CIRCUIT	EC-340
P0420	0420	TW CATALYST SYS-B1	EC-346
P0430	0430	TW CATALYST SYS-B2	EC-346
P0440	0440	EVAP SMALL LEAK	EC-350
P0443	0443	PURG VOLUME CONT/V	EC-360
P0446	0446	VENT CONTROL VALVE	EC-366
P0450	0450	EVAP SYS PRES SEN	EC-373
P0455	0455	EVAP GROSS LEAK	EC-381
P0460	0460	FUEL LEV SEN SLOSH	EC-389
P0461	0461	FUEL LEVEL SENSOR	EC-394
P0464	0464	FUEL LEVL SEN/CIRC	EC-396
P0500	0500	VEH SPEED SEN/CIRC	EC-400
P0505	0505	ISC SYSTEM/FNCTN	EC-402
P0550	0550	PW ST P SEN/CIRC	EC-404
P0605	0605	ECM	EC-409
P0650	0650	MIL/CIRC	EC-412
P0705	0705	PNP SW/CIRC	AT-85
P0710	0710	ATF TEMP SEN/CIRC	AT-118
P0720	0720	VEH SPD SEN/CIR AT	AT-89

INDEX FOR DTC

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0740	0740	TCC SOLENOID/CIRC	AT-94
P0744	0744	A/T TCC S/V FNCTN	AT-97
P0745	0745	L/PRESS SOL/CIRC	AT-101
P1065	1065	ECM BACK UP/CIRC	EC-416
P1110	1110	INT/V TIM CONT-B1	EC-420
P1111	1111	INT/V TIM V/CIR-B1	EC-429
P1119	1119	RADI TEMP SEN/CIRC	EC-435
P1121	1121	ETC ACTR*7	EC-440
P1122	1122	ETC FUNCTION/CIRC*7	EC-443
P1123	1123	ETC MOT RLY/CIRC*7	EC-447
P1135	1135	INT/V TIM CONT-B2	EC-420
P1136	1136	INT/V TIM V/CIR-B2	EC-429
P1140	1140	INTK TIM S/CIRC-B1	EC-452
P1145	1145	INTK TIM S/CIRC-B2	EC-452
P1148	1148	CLOSED LOOP-B1	EC-460
P1168	1168	CLOSED LOOP-B2	EC-460
P1211	1211	TCS C/U FUNCTN	EC-462
P1212	1212	TCS/CIRC	EC-463
P1217	1217	ENG OVER TEMP	EC-464
P1220	1220	FPCM/CIRCUIT	EC-472
P1320	1320	IGN SIGNAL-PRIMARY	EC-479
P1336	1336	CKP SENSOR (COG)	EC-490
P1440	1440	EVAP SMALL LEAK	EC-498
P1444	1444	PURG VOLUME CONT/V	EC-500
P1446	1446	VENT CONTROL VALVE	EC-509
P1447	1447	EVAP PURG FLOW/MON	EC-516
P1448	1448	VENT CONTROL VALVE	EC-522
P1464	1464	FUEL LEVL SEN/CIRC	EC-530
P1480	1480	FAN CONT S/V CIRC	EC-534
P1490	1490	VC/V BYPASS/V	EC-540
P1491	1491	VC CUT/V BYPASS/V	EC-546
P1605	1605	A/T DIAG COMM LINE	EC-554
P1610 - P1615	1610 - 1615	NATS MALFUNCTION*8	BL-146
P1706	1706	P-N POS SW/CIRCUIT	EC-555
P1716	1716	TURBINE REV S/CIRC	AT-123
P1720	1720	V/SP SEN (A/T OUT)	EC-561
P1730	1730	A/T INTERLOCK	AT-129
P1752	1752	I/C SOLENOID/CIRC	AT-138
P1754	1754	I/C SOLENOID FNCTN	AT-141
P1757	1757	FR/B SOLENOID/CIRC	AT-144
P1759	1759	FR/B SOLENOID FNCT	AT-147
P1762	1762	D/C SOLENOID/CIRC	AT-150

INDEX FOR DTC

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P1764	1764	D/C SOLENOID FNCTN	AT-153
P1767	1767	HLR/C SOL/CIRC	AT-156
P1769	1769	HLR/C SOL FNCTN	AT-159
P1772	1772	LC/B SOLENOID/CIRC	AT-162
P1774	1774	LC/B SOLENOID FNCT	AT-165
P1780	1780	SHIFT SIG FNCTN	EC-563
P1805	1805	BRAKE SW/CIRCUIT	EC-565

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: When the fail-safe operation occurs, the MIL illuminates.
*6: The trouble shooting for this DTC needs CONSULT-II.
*7: For the type II or type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .), if the ECM detect a malfunction for this self-diagnosis, the DTC will be stoned even in a 1st trip.
*8: The MIL will not be illuminated for these DTCs with type II or type III vehicle.

NOTE:
Regarding F50 models, “B1” or “BK1” indicates bank 1, “B2” or “BK2” indicates bank 2.

PRECAUTIONS

PFP:00001

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

EBS003C6

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 harnesses or harness connectors.**

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

EBS000PU

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

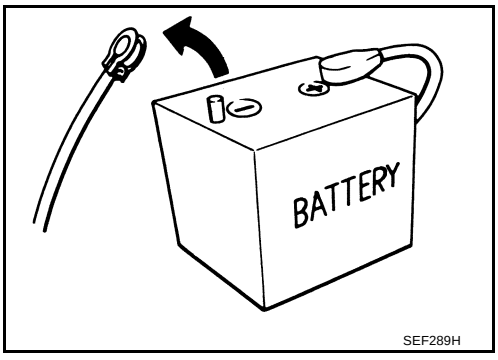
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-65, "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 MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or 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

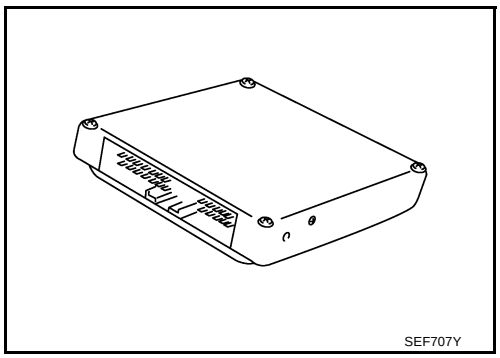
EBS000PV

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. 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.**

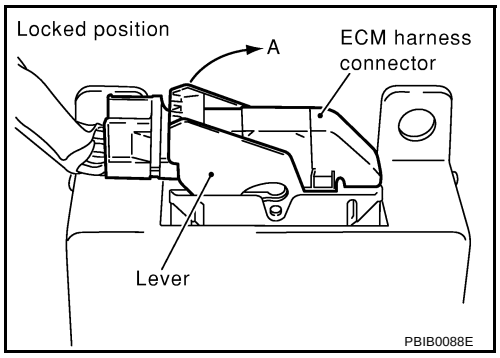


SEF289H

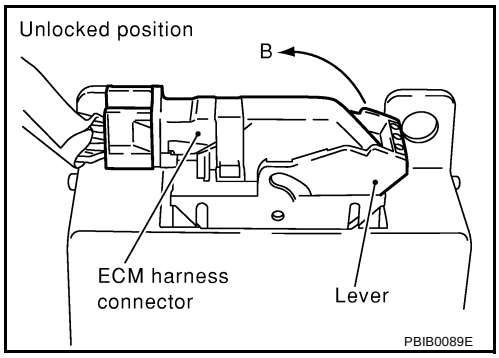
- **Do not disassemble ECM.**
- **If a battery terminal is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do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


SEF707Y

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at right.**

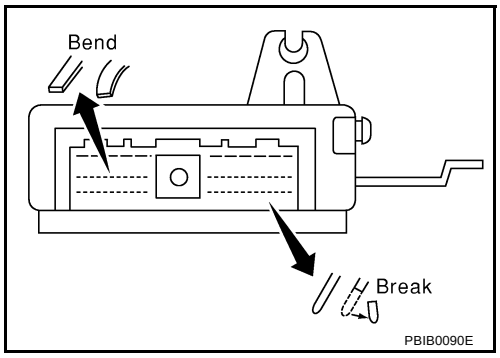


PBIB0088E



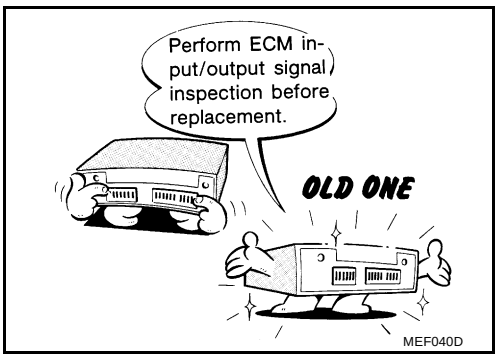
PBIB0089E

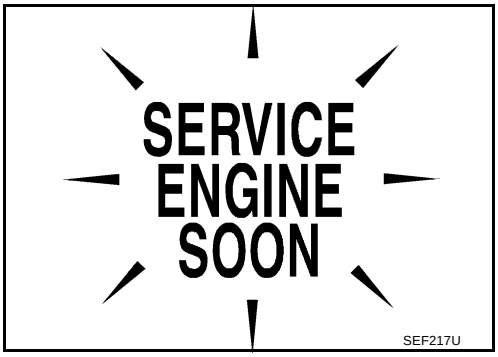
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control 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.**



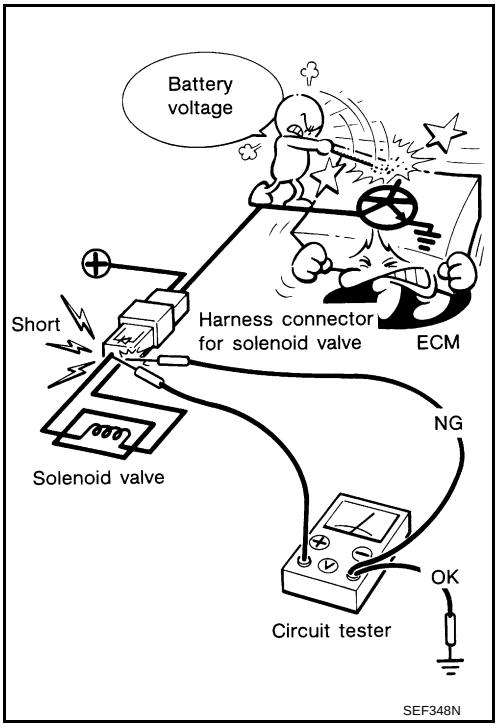
PBIB0090E

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-109 .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious problems.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**
- **After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”.**
  The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed.

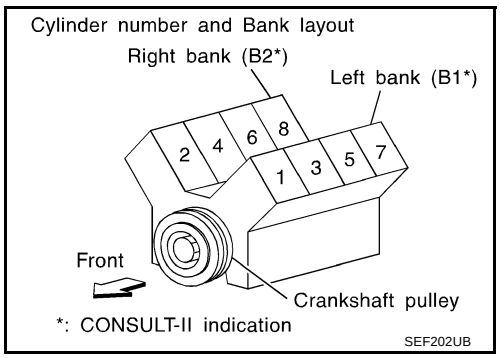




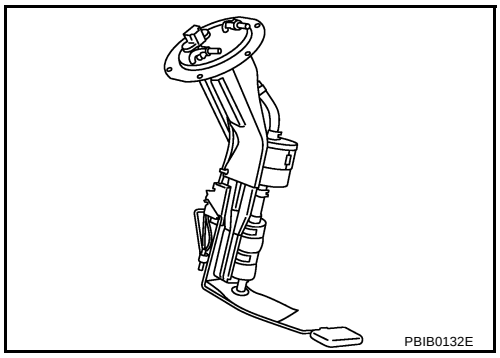
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to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



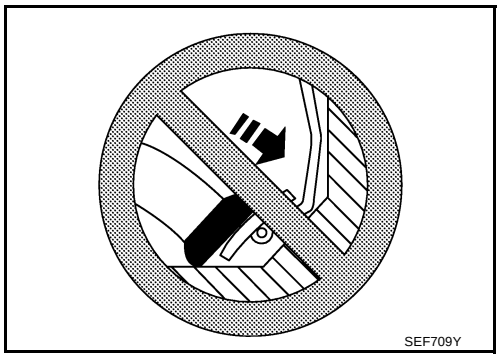
- **Regarding model F50, “-B1” indicates the bank 1 and “-B2” indicates the bank 2 as shown in the figure.**



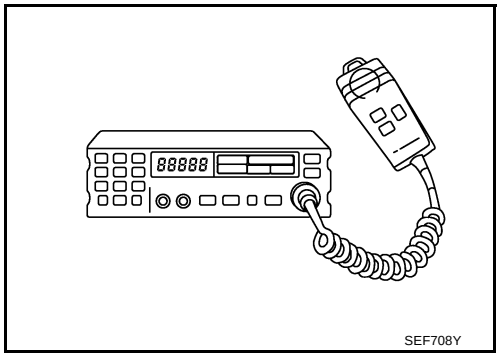
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **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 radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



Wiring Diagrams and Trouble Diagnosis

EBS000PW

When you read Wiring diagrams, refer to the following:

- ***GI-14, "How to Read Wiring Diagrams"***
- ***PG-2, "POWER SUPPLY ROUTING"*** for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- ***GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"***
- ***GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"***

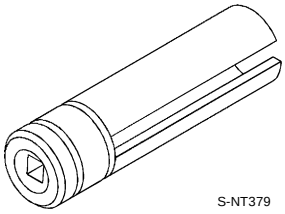
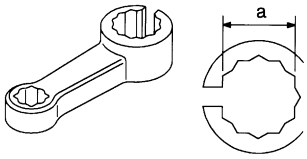
PREPARATION

PFP:00002

Special Service Tools

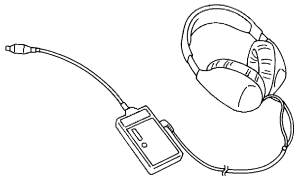
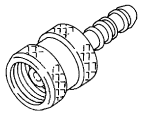
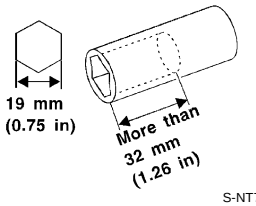
EBS000PX

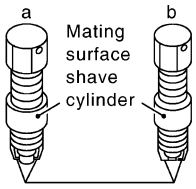
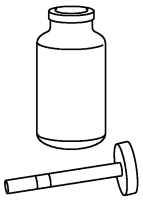
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
KV10117100 (J36471-A) Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 (J38365) Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors **a: 22 mm (0.87 in)**

Commercial Service Tools

EBS000PY

Tool name (Kent-Moore No.)		Description
Leak detector (J41416)	 S-NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 S-NT704	Applying positive pressure through EVAP service port
Fuel filler cap adapter (MLR-8382)	 S-NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor

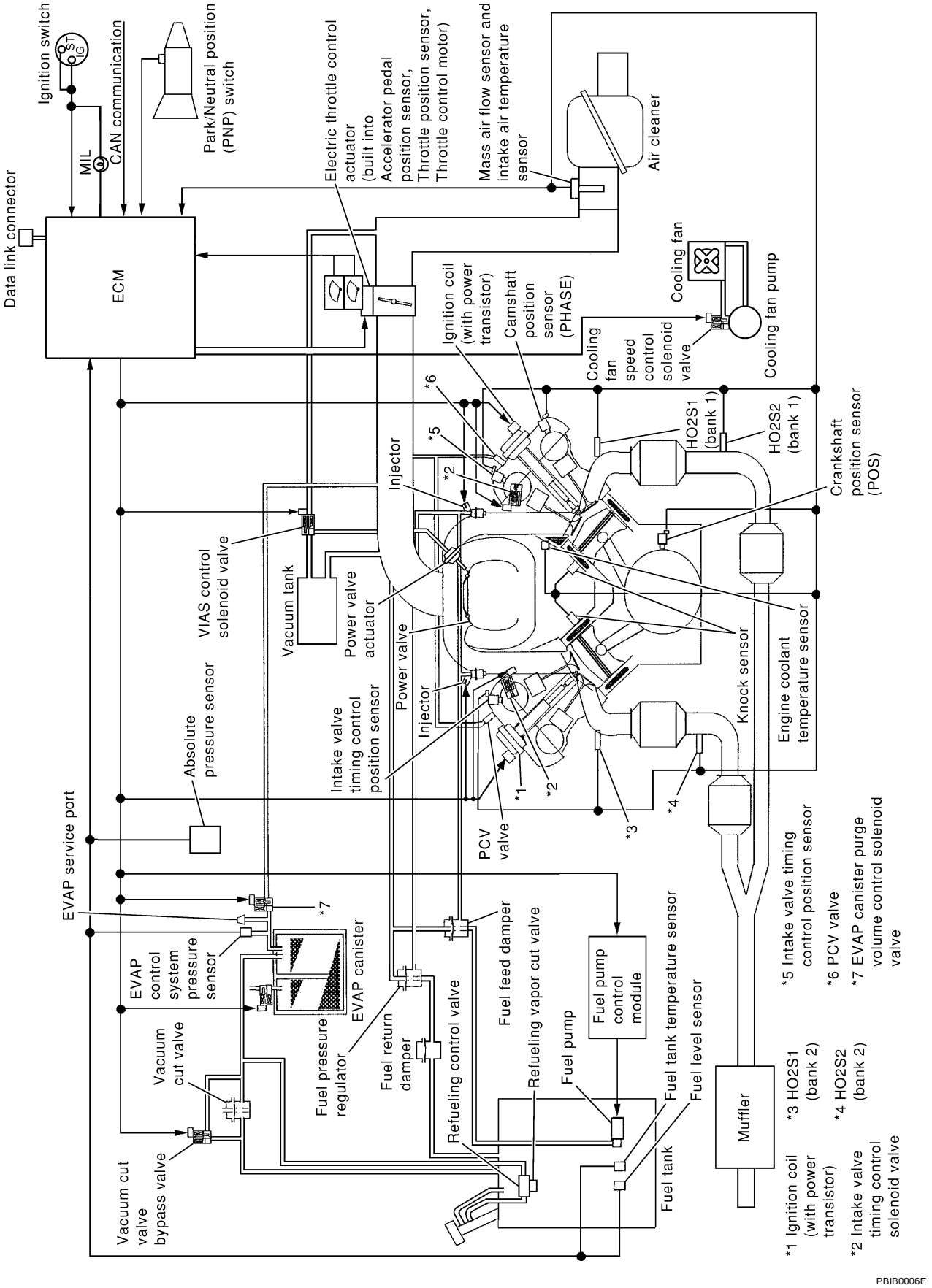
Tool name (Kent-Moore No.)		Description
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 S-NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor**
Anti-seize lubricant (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

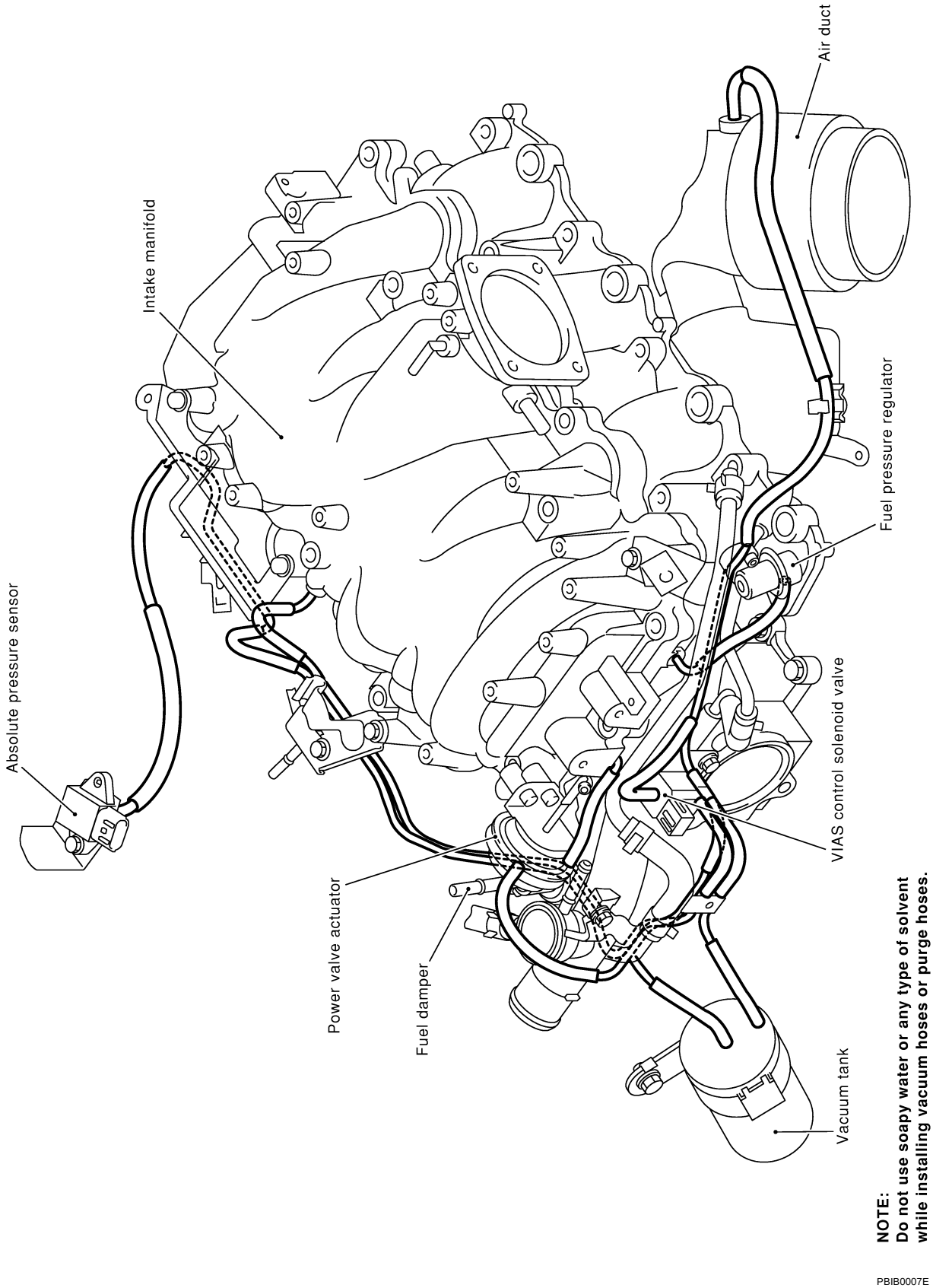
EBS000Q0



PBIB0006E

Vacuum Hose Drawing

EBS000Q1



Refer to [EC-23, "System Diagram"] for Vacuum Control System.

System Chart

EBS000Q2

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow 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 ● Absolute pressure sensor ● Power steering pressure sensor ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Fuel level sensor*1 ● EVAP control system pressure sensor *1 ● Fuel tank temperature sensor *1 ● Heated oxygen sensor 2 *2 ● TCM (Transmission control module) *3 ● VDC/TCS/ABS control unit *3 ● Vehicle speed *3 ● Air conditioner switch *3 ● Electrical load *3	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Nissan torque demand control system	● Electric throttle control actuator ● Fuel injectors
	Fuel pump control	● Fuel pump relay ● Fuel pump control module (FPCM)
	On board diagnostic system	MIL (On the instrument panel)
	Power valve control	VIAS control solenoid valve
	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
	Cooling fan speed control	Cooling fan speed control solenoid valve
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: The signals are sent to the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

EBS000Q3

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed Piston position	Fuel injection & mixture ratio control	Fuel injectors
Camshaft position sensor (PHASE)			
Mass air flow 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	Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Ignition switch	Start signal		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Ambient air barometric pressure		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2 *1	Density of oxygen in exhaust gas		
VDC/TCS/ABS control unit *2	VDC/TCS operation command		
Vehicle speed *2	Vehicle speed		
Air conditioner switch *2	Air conditioner operation		

*1: Under normal conditions, this sensor is not for engine control operation.
*2: Signals are sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

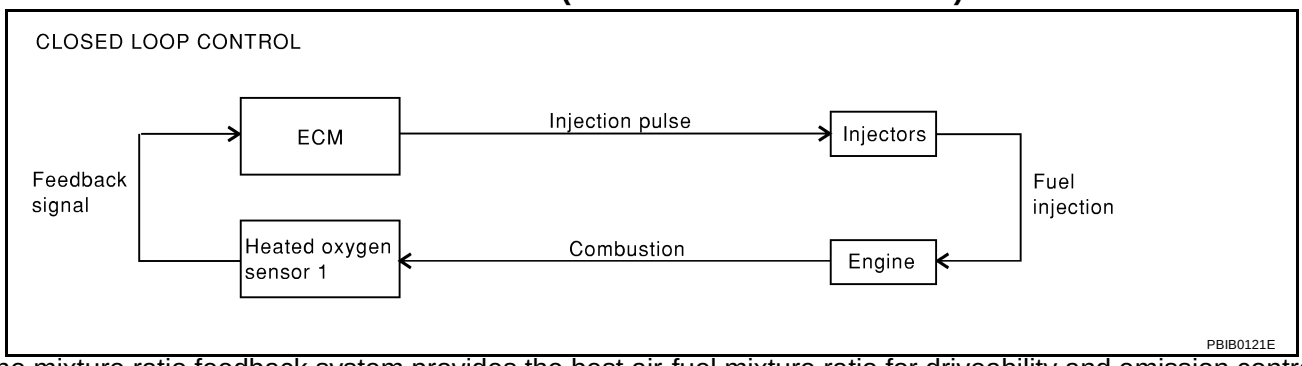
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- 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-197 . 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

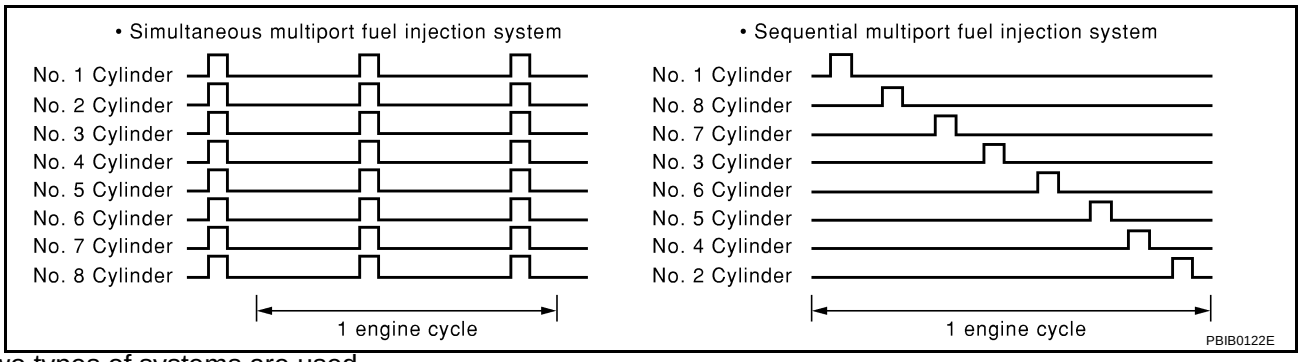
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- 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”
- 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 originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) 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 eight cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The eight 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

EBS000Q4

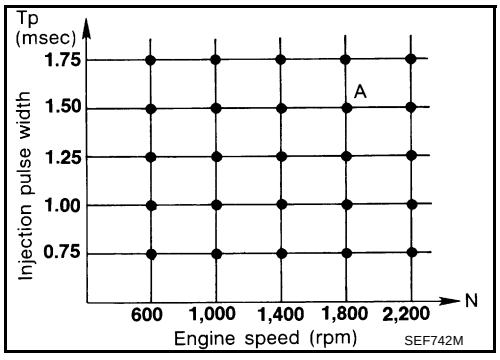
INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Throttle valve idle position		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		
Vehicle speed *1	Vehicle speed		

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

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.

Nissan Torque Demand (NTD) Control System

EBS003CU

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	NTD control	Electric throttle control actuator and fuel injector
Crankshaft position sensor (POS)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Electric throttle control actuator	Accelerator pedal position and throttle position		
PNP switch	Gear position		
Power steering pressure sensor	Power steering operation		
Battery	Battery voltage		
TCM (CAN communication)	A/T control signal		
A/C auto. amp. *1	Air conditioner operation		
VDC/TCS/ABS control unit *1	VDC/TCS/ABS operation		
Combination meter *1	Vehicle speed		
Electric load *1	Electrical load signal		

*1: Signals are sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

NTD control system decides the target traction based on the accelerator operation status and the current driving condition. It then selects the engine torque target by correcting running resistance and atmospheric pressure, and controlling the power-train. Using electric throttle control actuator, it achieves the engine torque development target which corresponds linearly to the driver's accelerator operation.

Running resistance correction control compares the engine torque estimate value, measured vehicle acceleration, and running resistance on a flat road, and estimates vehicle weight gain and running resistance variation caused by slopes to correct the engine torque estimate value.

Atmospheric pressure correction control compares the engine torque estimate value from the airflow rate and the target engine torque for the target traction, and estimates variation of atmospheric pressure to correct the target engine torque. This system achieves powerful driving without reducing engine performance in the practical speed range in mountains and high-altitude areas.

Air Conditioning Cut Control

EBS000Q5

INPUT/OUTPUT SIGNAL CHART

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)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Vehicle speed *1	Vehicle speed		

*1: Signals are sent to the ECM through CAN communication line.

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 operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

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

EBS000Q6

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	Closed throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Vehicle speed *1	Vehicle speed		

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

SYSTEM DESCRIPTION

If the engine speed is above 1,400 rpm with no load (for example, in neutral and engine speed over 1,400 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 1,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-26 .

CAN Communication

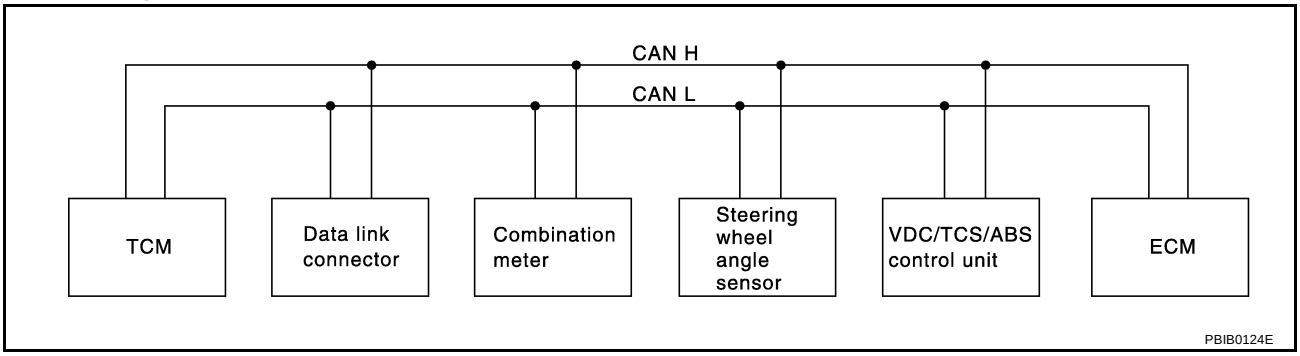
EBS003GJ

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.

FOR VDC MODELS

System Diagram



Input/output Signal Chart

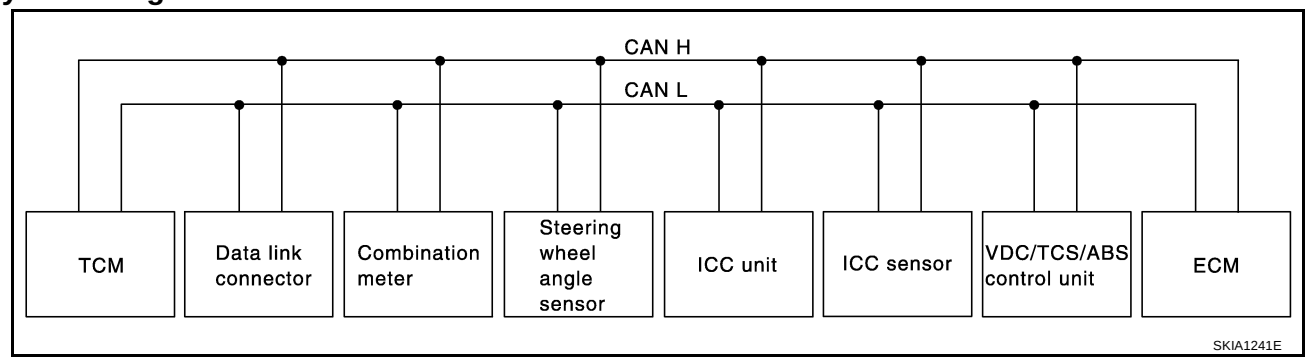
T: Transmit R: Receive

Signals	TCM	Combination meter	Steering wheel angle sensor	VDC / TCS / ABS control unit	ECM
Engine speed signal	R	R		R	T
Engine coolant temperature signal	R	R			T
Accelerator pedal position signal	R			R	T
Engine torque signal	R			R	T
Battery voltage signal	R				T
Closed throttle position signal	R				T
Wide open throttle position signal	R				T
Lock-up prohibition signal	R				T
Torque-down permission signal	R				T
Fuel consumption monitor signal		R			T
Lock-up signal	T				R
Hard deceleration signal	T				R
Torque-down signal	T				R
Power mode indicator signal	T				R
A/T fluid temperature warning lamp signal	T	R			R
Current gear position signal	T	R		R	R
	R	T			
Next gear position signal	T			R	R
Shift change signal	T			R	R
Shift pattern signal	T				R
VDC system control signal				T	R
VDC operation signal				T	R
Stop lamp switch signal	R			T	
Steering wheel angle sensor signal	R		T	R	R
Air conditioner switch signal		T			R
Headlamp switch signal		T			R
Rear window defogger switch signal		T			R
OD canncel switch signal	R	T		R	
Brake switch signal	R	T			
Power mode switch signal	R	T			

Signals	TCM	Combination meter	Steering wheel angle sensor	VDC / TCS / ABS control unit	ECM
Vehicle speed signal	R	R		T	
	R	T			R
	T				R

FOR ICC MODELS

System Diagram



Input/output Signal Chart

T: Transmit R: Receive

Signals	TCM	Combination meter	Steering wheel angle sensor	ICC unit	ICC sensor	VDC / TCS / ABS control unit	ECM
ICC system display signal		R		T			
ICC sensor signal				R	T		
Engine speed signal	R	R		R		R	T
Engine coolant temperature signal	R	R					T
Accelerator pedal position signal	R					R	T
Engine torque signal	R					R	T
Battery voltage signal	R						T
Closed throttle position signal	R			R			T
Lock-up prohibition signal	R						T
Torque-down permission signal	R						T
Fuel consumption monitor signal		R					T
Lock-up signal	T						R
Hard deceleration signal	T						R
Torque-down signal	T						R
Power mode indicator signal	T						R
A/T fluid temperature warning lamp signal	T	R					R
Current gear position signal	T	R				R	R
	R	T					
Next gear position signal	T					R	R
Shift change signal	T					R	R
Shift pattern signal	T			R			R
VDC system control signal						T	R
VDC operation signal				R		T	R
Stop lamp switch signal	R					T	
Steering wheel angle sensor signal	R		T			R	R

Signals	TCM	Combination meter	Steering wheel angle sensor	ICC unit	ICC sensor	VDC / TCS / ABS control unit	ECM
Air conditioner switch signal		T					R
Headlamp switch signal		T					R
Rear window defogger switch signal		T					R
OD cancel switch signal	R	T				R	
Brake switch signal	R	T					
Power mode switch signal	R	T					
Vehicle speed signal	R	R		R		T	
	R	T					R
	T			R			R

BASIC SERVICE PROCEDURE

PFP:00018

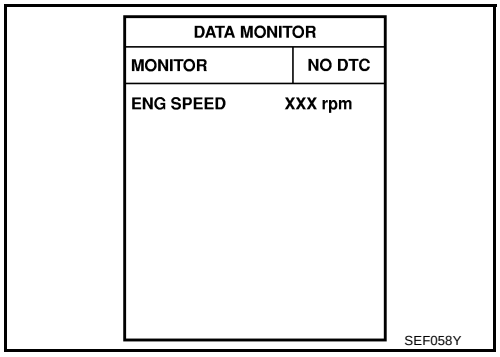
Idle Speed and Ignition Timing Check

EBS000Q7

IDLE SPEED

Using CONSULT-II

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

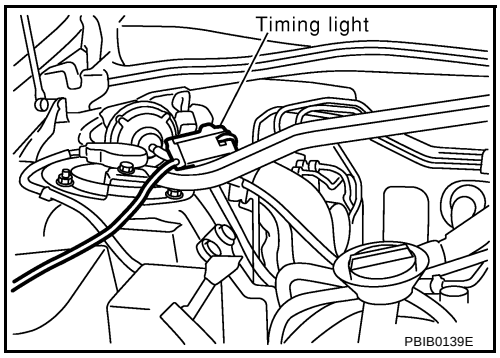


IGNITION TIMING

Any of following two methods may be used.

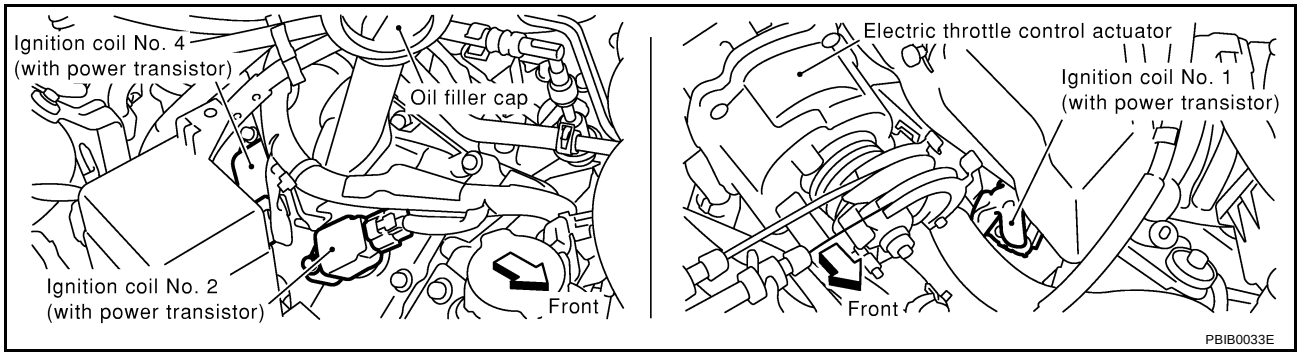
Method A

1. Attach timing light to loop wire as shown.
2. Check ignition timing.

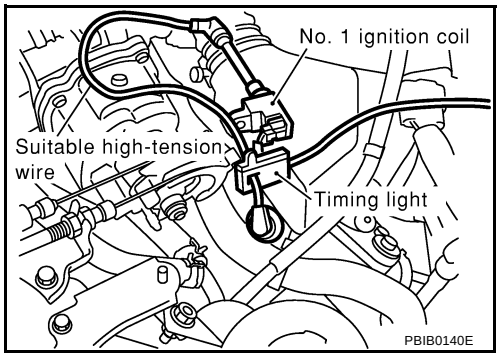


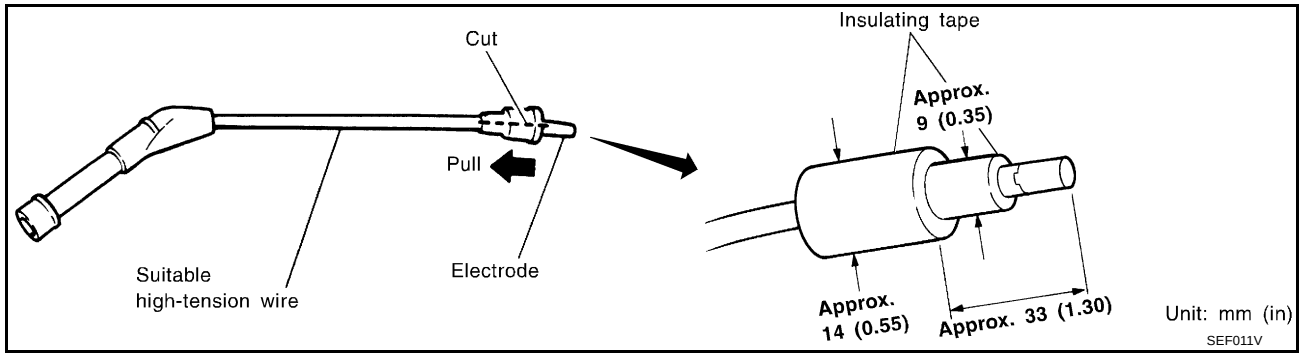
Method B

1. Remove No. 1 ignition coil.

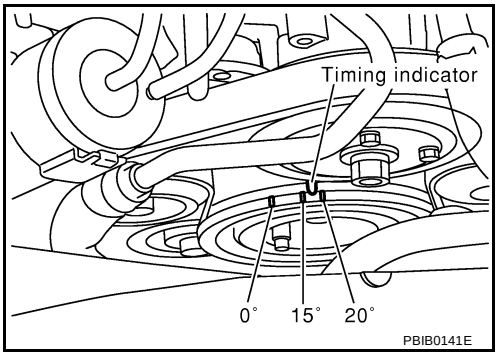


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



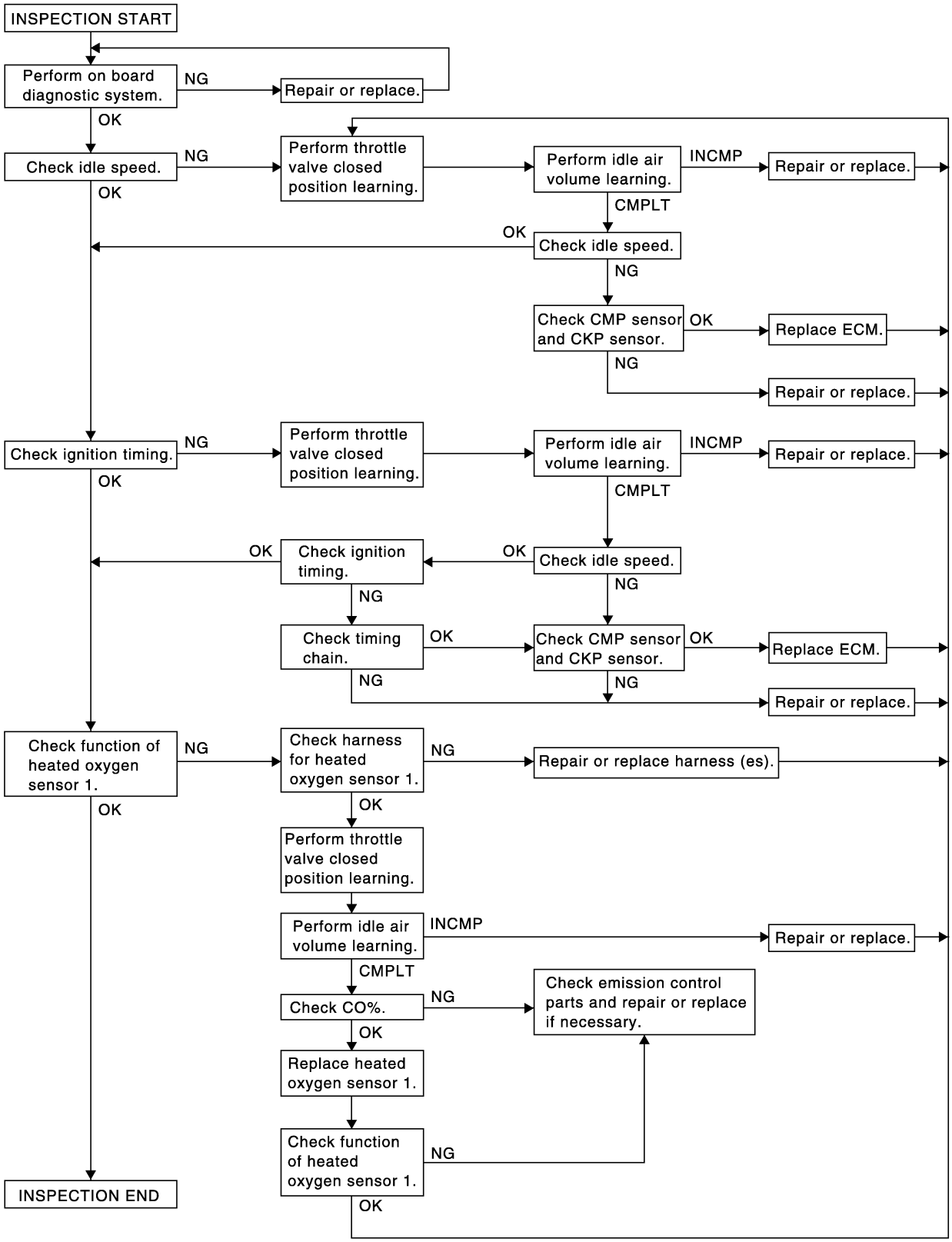
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

EBS000Q8

PREPARATION

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- Throttle valve
- Evaporative emission system
2. On air conditioner equipped models, checks should be carried out while the air conditioner is “OFF”.
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in “N” position.
4. When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear window defogger.
6. Keep front wheels pointed straight ahead.

OVERALL INSPECTION SEQUENCE



NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

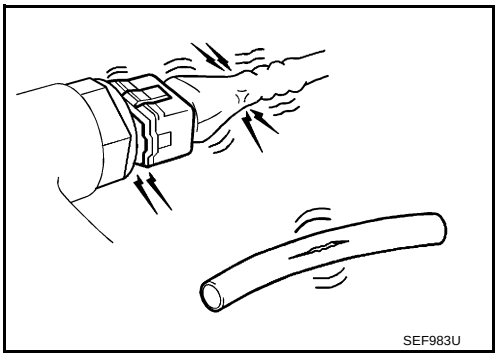
PBIB0804E

NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

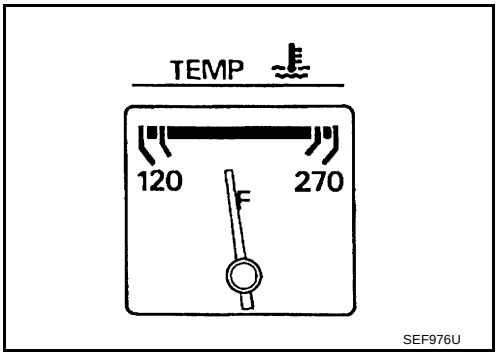
INSPECTION PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, 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


SEF983U

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.

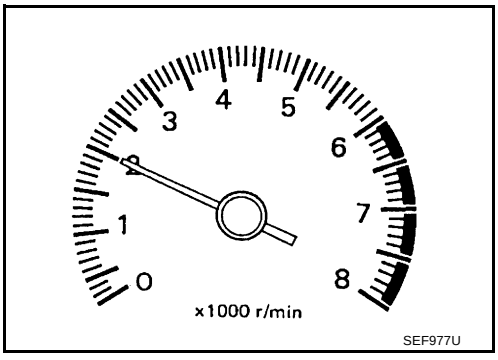


SEF976U

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

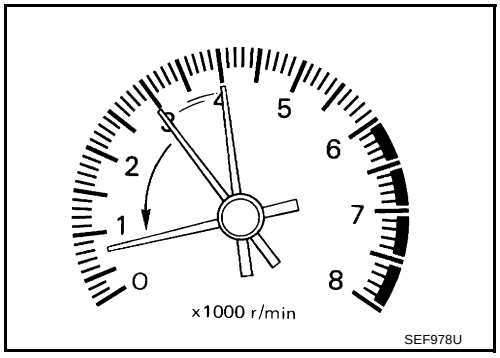
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

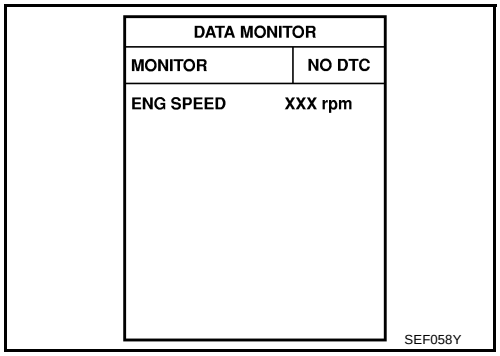
With CONSULT-II

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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-45, "Idle Air Volume Learning" .
Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 6.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

6. 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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. refer to EC-340 .
- Check crankshaft position sensor (POS) and circuit. refer to EC-331 , EC-490 .

OK or NG

OK >> GO TO 8.
NG >> 1. Repair or replace.
2. GO TO 4.

8. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

9. CHECK IGNITION TIMING

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

17 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK (With CONSULT-II)>>GO TO 17.
OK (Without CONSULT-II)>>GO TO 18.
NG >> GO TO 10.

10. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .

>> GO TO 11.

11. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-45, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT >> GO TO 12.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

12. 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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 13.
NG >> GO TO 15.

13. CHECK IGNITION TIMING AGAIN

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

17 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK (With CONSULT-II)>>GO TO 17.
OK (Without CONSULT-II)>>GO TO 18.
NG >> GO TO 14.

14. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-45, "TIMING CHAIN" .

OK or NG

OK >> GO TO 15.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

15. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. refer to EC-340 .
- Check crankshaft position sensor (POS) and circuit. refer to EC-331 , EC-490 .

OK or NG

OK >> GO TO 16.
NG >> 1. Repair or replace.
2. GO TO 4.

16. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

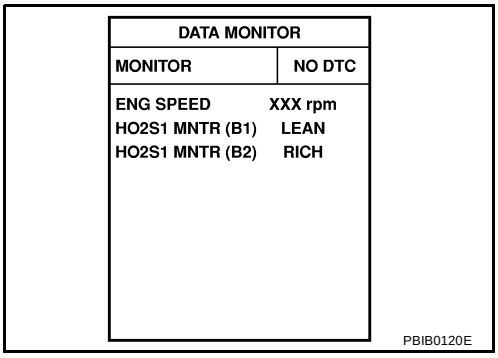
17. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

   1 time: RICH → LEAN → RICH

   2 times: RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> GO TO 19.
NG (Monitor does not fluctuate.)>>GO TO 21.
NG (Monitor fluctuates less than 5 times.)>>GO TO 28.

18. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

Without CONSULT-II

1. Stop engine and set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to EC-67, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
2. Start engine and run it at about 2,000 rpm for about 2 minutes under no-load.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> GO TO 20.
NG (MIL does not come on)>>GO TO 21.
NG (MIL comes on less than 5 times)>>GO TO 28.

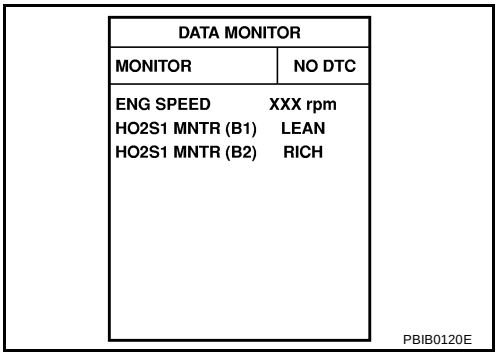
19. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

With CONSULT-II

1. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

   1 time: RICH → LEAN → RICH

   2 times: RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> **INSPECTION END**
NG (Monitor does not fluctuate.)>>GO TO 22.
NG (Monitor fluctuates less than 5 times.)>>GO TO 28.

20. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

Without CONSULT-II

1. Switch the monitored sensor from bank 1 to bank 2. Refer to EC-67, "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa" .
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> **INSPECTION END**
NG (MIL does not come on)>>GO TO 22.
NG (MIL comes on less than 5 times)>>GO TO 28.

21. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS

1. Turn ignition switch “OFF” and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (bank 1) harness connector.
4. Check harness continuity between ECM terminal 114 and heated oxygen sensor 1 (bank 1) terminal 1. Refer to Wiring Diagram, EC-200, "BANK 1" .

Continuity should exist.

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

OK or NG

OK >> GO TO 23.
NG >> 1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 1).
2. GO TO 4.

22. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS

1. Turn ignition switch “OFF” and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (bank 2) harness connector.
4. Check harness continuity between ECM terminal 115 and heated oxygen sensor 1 (bank 2) terminal 1. Refer to Wiring Diagram, EC-202, "BANK 2" .

Continuity should exist.

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

OK or NG

OK >> GO TO 23
NG >> 1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 2).
2. GO TO 4.

23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-45, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP?

CMPLT or INCMP

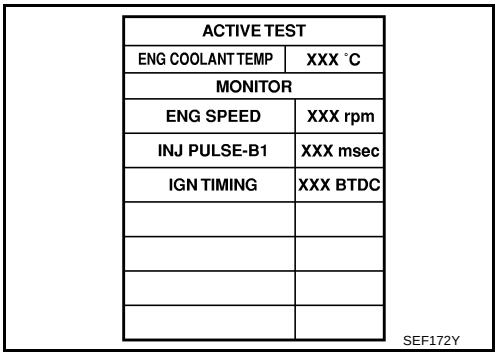
CMPLT (With CONSULT-II)>>GO TO 25.
CMPLT (Without CONSULT-II)>>GO TO 26.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

25. CHECK “CO” %

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check “CO” %.

Idle CO: 0.7 – 9.9 % and engine runs smoothly.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

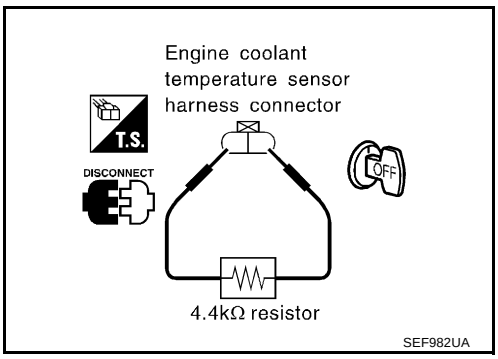
26. CHECK “CO” %

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch “OFF”.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check “CO” %.

Idle CO: 0.7 – 9.9 % and engine runs smoothly.

7. After checking “CO” %, turn ignition switch “OFF”, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

27. RECONNECT HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch “OFF”.
2. Reconnect heated oxygen sensor 1 harness connector.

>> GO TO 31.

28. REPLACE HEATED OXYGEN SENSOR 1

1. Stop engine.
2. Replace heated oxygen sensor 1 on the malfunctioning bank.

With CONSULT-II>>GO TO 29.
Without CONSULT-II>>GO TO 30.

29. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) / (BANK 2) SIGNAL

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. See “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

30. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) / (BANK 2) SIGNAL

Without CONSULT-II

1. Set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to EC-67, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
2. Switch the monitored sensor to the malfunctioning bank. Refer to EC-67, "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa" .
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

31. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator and repair or replace if necessary. Refer to EC-49 .
- Check mass air flow sensor and its circuit, and repair or replace if necessary. Refer to EC-154 .
- Check injector and its circuit, and repair or replace if necessary. Refer to EC-579 .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary. Refer to EC-173 and EC-193 .

OK or NG

OK >> GO TO 33.
NG >> 1. Repair or replace.
2. GO TO 32.

32. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC might be displayed.
Erase the stored memory in ECM and TCM. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-37 .

>> GO TO 4.

33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

Throttle Valve Closed Position Learning

EBS002R7

DESCRIPTION

"Throttle Valve Closed Position Learning" is an operation to learn the fully closed position of the throttle valve by monitorizing 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. Turn ignition switch "ON".
2. Turn ignition switch "OFF" wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

EBS01AJ7

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

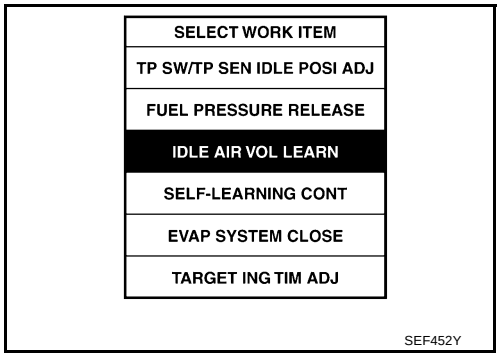
Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 99°C (158 - 210°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 models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

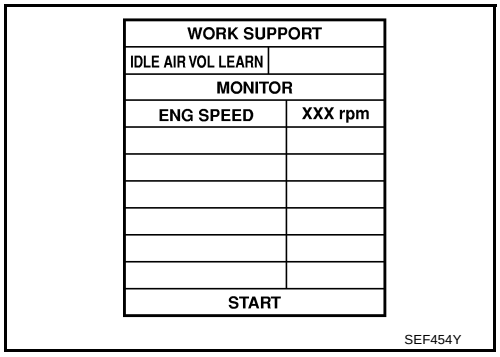
OPERATION PROCEDURE

With CONSULT-II

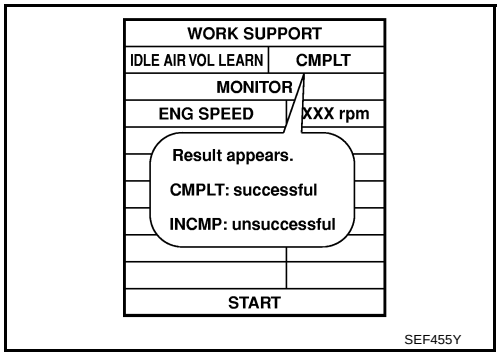
1. Perform EC-45, "Throttle Valve Closed Position Learning" .
2. Start engine and warm it up to normal operating temperature.
3. Check that all items listed under the topic “PRE-CONDITIONING” (previously mentioned) are in good order.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



5. Touch “START” and wait 20 seconds.



6. Make sure that “CMPLT” is 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 problem by referring to the “Diagnostic Procedure” below.
7. 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	650 ± 50 rpm (in “P” or “N” position)
Ignition timing	17 ± 5° BTDC (in “P” or “N” position)

Without CONSULT-II

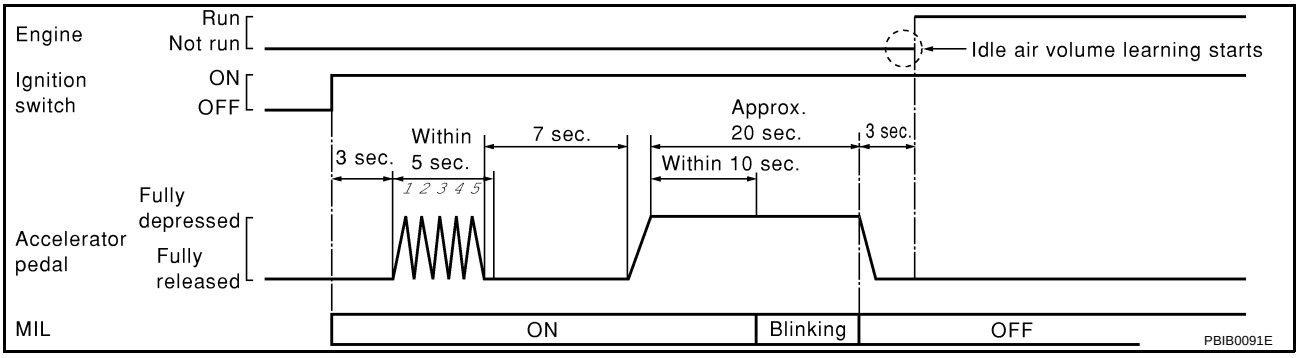
NOTE:

- **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.**

1. Perform EC-45, "Throttle Valve Closed Position Learning" .
2. Start engine and warm it up to normal operating temperature.
3. Check that all items listed under the topic “PRE-CONDITIONING” (previously mentioned) are in good order.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL goes off.
8. Fully release the accelerator pedal within 3 seconds after the MIL goes off.
9. Start engine and let it idle.
10. Wait 20 seconds.



11. 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	650 ± 50 rpm (in “P” or “N” position)
Ignition timing	17 ± 5° BTDC (in “P” or “N” position)

12. If idle speed and ignition timing are not within the specification, the result will be incomplete. In this case, find the cause of the problem 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 problem.**
   It is useful to perform EC-138, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform “Idle air volume learning” all over again:**

- **Engine stalls.**
- **Erroneous idle.**

Fuel Pressure Check

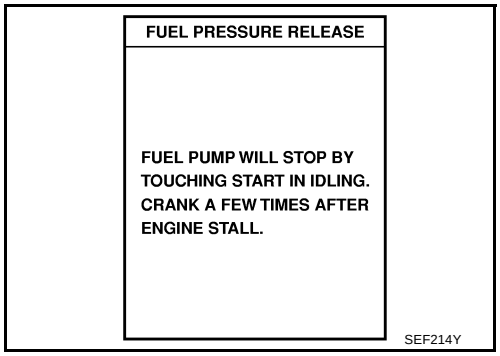
EBS000QA

FUEL PRESSURE RELEASE

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

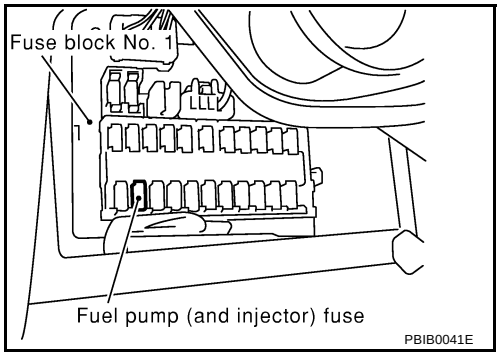
With CONSULT-II

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”.



Without CONSULT-II

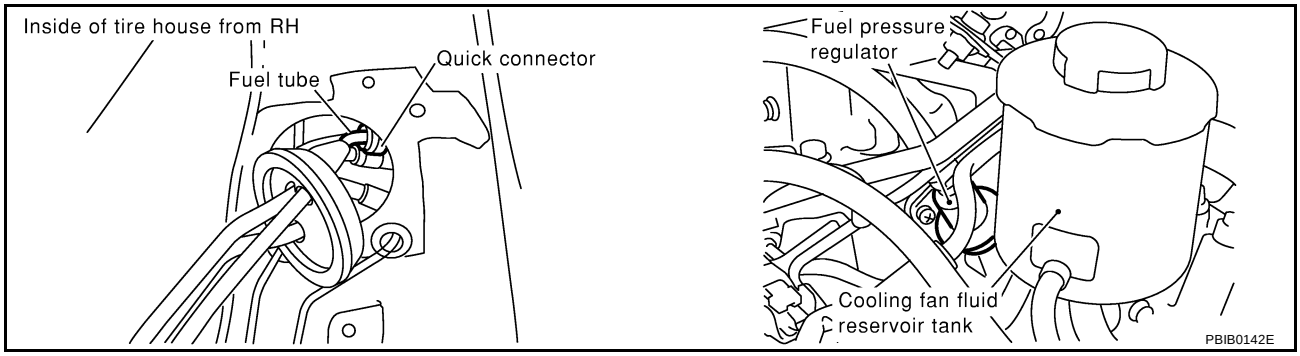
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch “OFF”.
5. Reinstall fuel pump fuse after servicing fuel system.



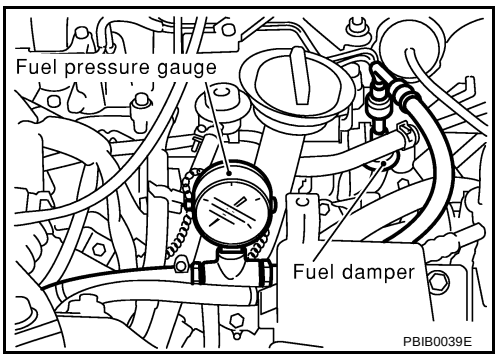
FUEL PRESSURE CHECK

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**
- **Do not use the fuel hose for checking fuel pressure more than 30 times.**
- **Do not use the fuel hose for checking fuel pressure with damage or cracks on it.**

1. Prepare a fuel hose for checking fuel pressure (Part No. 16511 6N210).
2. Cut this fuel hose at the middle and connect a fuel pressure gauge.
3. Release fuel pressure to zero.
4. Disconnect fuel hose between fuel pressure regulator and fuel tube to fuel tank.



5. Install the pressure gauge between fuel pressure regulator and fuel tube to the fuel tank as shown in the figure.
6. Start engine and check for fuel leakage.
7. Read the indication of fuel pressure gauge.



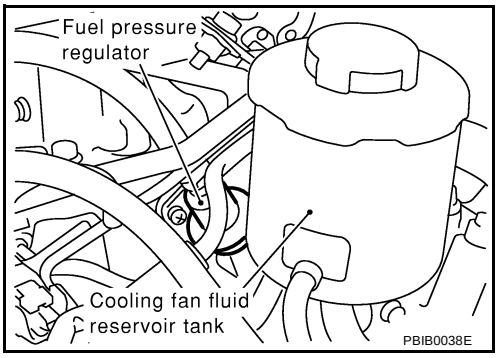
At idling:

With vacuum hose connected	**Approximately 235 kPa (2.4 kg/cm^2 , 34 psi)**
With vacuum hose disconnected	**Approximately 294 kPa (3.0 kg/cm^2 , 43 psi)**

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

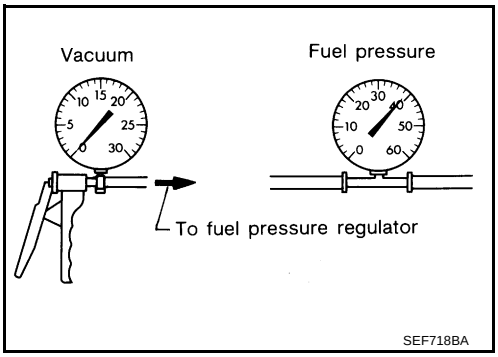
FUEL PRESSURE REGULATOR CHECK

1. Stop engine and disconnect fuel pressure regulator vacuum hose from vacuum gallery.
2. Plug vacuum gallery with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS001FA

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

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979
Calibration ID	Mode 9 of SAE J1979

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

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-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 lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer toEC-80 .)

Two Trip Detection Logic

EBS001FB

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	—	—	×	—	—	×	—	—
Electric throttle control actuator — DTC P1121, P1122*2	—	—	—	—	×	—	—	—
Throttle control motor relay — DTC P1123*2	—	—	—	—	×	—	—	—
Closed loop control — DTC: P1148, P1168	—	×	—	—	×	—	—	—

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Fail-safe items (Refer to EC-80 .)	—	×	—	—	×*1	—	×*1	—
Except above	—	—	—	×	—	×	×	—

*1: Except “ECM”
*2: For type II or type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .).

Emission-related Diagnostic Information

EBS001FC

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CONSULT-II GST*2	ECM*3					
U1000	1000*5	CAN COMM CIRCUIT	—	—		EC-151
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**—**
P0100	0100	MAF SEN/CIRCUIT	—	—	×	EC-154
P0105	0105	ABSL PRES SEN/CIRC	—	—	×	EC-163
P0110	0110	AIR TEMP SEN/CIRC	—	—	×	EC-168
P0115	0115	COOLANT T SEN/CIRC	—	—	×	EC-173
P0120	0120	THRTL POS SEN/CIRC	—	—	×*6	EC-178
P0121	0121	ACCEL POS SEN/CIRC	—	—	×*6	EC-186
P0125	0125	*COOLANT T SEN/CIRC	—	—	×	EC-193
P0130	0130	HO2S1 (B1)	×	×	×*4	EC-197
P0131	0131	HO2S1 (B1)	×	×	×*4	EC-207
P0132	0132	HO2S1 (B1)	×	×	×*4	EC-213
P0133	0133	HO2S1 (B1)	×	×	×*4	EC-220
P0134	0134	HO2S1 (B1)	×	×	×*4	EC-232
P0135	0135	HO2S1 HTR (B1)	×	×	×*4	EC-241
P0137	0137	HO2S2 (B1)	×	×	×*4	EC-249
P0138	0138	HO2S2 (B1)	×	×	×*4	EC-260
P0139	0139	HO2S2 (B1)	×	×	×*4	EC-271
P0140	0140	HO2S2 (B1)	×	×	×*4	EC-282
P0141	0141	HO2S2 HTR (B1)	×	×	×*4	EC-293
P0150	0150	HO2S1 (B2)	×	×	×*4	EC-197
P0151	0151	HO2S1 (B2)	×	×	×*4	EC-207
P0152	0152	HO2S1 (B2)	×	×	×*4	EC-213
P0153	0153	HO2S1 (B2)	×	×	×*4	EC-220
P0154	0154	HO2S1 (B2)	×	×	×*4	EC-232
P0155	0155	HO2S1 HTR (B2)	×	×	×*4	EC-241
P0157	0157	HO2S2 (B2)	×	×	×*4	EC-249

DTC*1		Items (CONSULT-II screen terms)	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CONSULT-II GST*2	ECM*3					
P0158	0158	HO2S2 (B2)	×	×	×*4	EC-260
P0159	0159	HO2S2 (B2)	×	×	×*4	EC-271
P0160	0160	HO2S2 (B2)	×	×	×*4	EC-282
P0161	0161	HO2S2 HTR (B2)	×	×	×*4	EC-293
P0171	0171	FUEL SYS-LEAN/BK1	—	—	×	EC-301
P0172	0172	FUEL SYS-RICH/BK1	—	—	×	EC-309
P0174	0174	FUEL SYS-LEAN/BK2	—	—	×	EC-301
P0175	0175	FUEL SYS-RICH/BK2	—	—	×	EC-309
P0180	0180	FUEL TEMP SEN/CIRC	—	—	×	EC-316
P0300	0300	MULTI CYL MISFIRE	—	—	×	EC-321
P0301	0301	CYL 1 MISFIRE	—	—	×	EC-321
P0302	0302	CYL 2 MISFIRE	—	—	×	EC-321
P0303	0303	CYL 3 MISFIRE	—	—	×	EC-321
P0304	0304	CYL 4 MISFIRE	—	—	×	EC-321
P0305	0305	CYL 5 MISFIRE	—	—	×	EC-321
P0306	0306	CYL 6 MISFIRE	—	—	×	EC-321
P0307	0307	CYL 7 MISFIRE	—	—	×	EC-321
P0308	0308	CYL 8 MISFIRE	—	—	×	EC-321
P0325	0325	KNOCK SEN/CIRC-B1	—	—	×	EC-327
P0330	0330	KNOCK SEN/CIRC-B2	—	—	×	EC-327
P0335	0335	CKP SEN/CIRCUIT	—	—	×	EC-331
P0340	0340	CMP SEN/CIRCUIT	—	—	×	EC-340
P0420	0420	TW CATALYST SYS-B1	×	×	×*4	EC-346
P0430	0430	TW CATALYST SYS-B2	×	×	×*4	EC-346
P0440	0440	EVAP SMALL LEAK	×	×	×*4	EC-350
P0443	0443	PURG VOLUME CONT/V	—	—	×	EC-360
P0446	0446	VENT CONTROL VALVE	—	—	×	EC-366
P0450	0450	EVAP SYS PRES SEN	—	—	×	EC-373
P0455	0455	EVAP GROSS LEAK	×	×	×*4	EC-381
P0460	0460	FUEL LEV SEN SLOSH	—	—	×	EC-389
P0461	0461	FUEL LEVEL SENSOR	—	—	×	EC-394
P0464	0464	FUEL LEVL SEN/CIRC	—	—	×	EC-396
P0500	0500	VEH SPEED SEN/CIRC	—	—	×	EC-400
P0505	0505	ISC SYSTEM/FNCTN	—	—	×	EC-402
P0550	0550	PW ST P SEN/CIRC	—	—	×	EC-404
P0605	0605	ECM	—	—	×	EC-409
P0650	0650	MIL/CIRC	—	—	×	EC-412
P0705	0705	PNP SW/CIRC	—	—	×	AT-85
P0710	0710	ATF TEMP SEN/CIRC	—	—	×	AT-118
P0720	0720	VEH SPD SEN/CIR AT	—	—	×	AT-89
P0740	0740	TCC SOLENOID/CIRC	—	—	×	AT-94

DTC*1		Items (CONSULT-II screen terms)	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CONSULT-II GST*2	ECM*3					
P0744	0744	A/T TCC S/V FNCTN	—	—	×	AT-97
P0745	0745	L/PRESS SOL/CIRC	—	—	×	AT-101
P1065	1065	ECM BACK UP/CIRC	—	—	×	EC-416
P1110	1110	INT/V TIM CONT-B1	—	—	×	EC-420
P1111	1111	INT/V TIM V/CIR-B1	—	—	×	EC-429
P1119	1119	RADI TEMP SEN/CIRC	—	—	×	EC-435
P1121	1121	ETC ACTR	—	—	×*6	EC-440
P1122	1122	ETC FUNCTION/CIRC	—	—	×*6	EC-443
P1123	1123	ETC MOT RLY/CIRC	—	—	×*6	EC-447
P1135	1135	INT/V TIM CONT-B2	—	—	×	EC-420
P1136	1136	INT/V TIM V/CIR-B2	—	—	×	EC-429
P1140	1140	INTK TIM S/CIRC-B1	—	—	×	EC-452
P1145	1145	INTK TIM S/CIRC-B2	—	—	×	EC-452
P1148	1148	CLOSED LOOP-B1	—	—	×	EC-460
P1168	1168	CLOSED LOOP-B2	—	—	×	EC-460
P1211	1211	TCS C/U FUNCTN	—	—	×	EC-462
P1212	1212	TCS/CIRC	—	—	×	EC-463
P1217	1217	ENG OVER TEMP	—	—	×	EC-464
P1220	1220	FPCM/CIRCUIT	—	—	×	EC-472
P1320	1320	IGN SIGNAL-PRIMARY	—	—	×	EC-479
P1336	1336	CKP SENSOR (COG)	—	—	×	EC-490
P1440	1440	EVAP SMALL LEAK	×	×	×*4	EC-498
P1444	1444	PURG VOLUME CONT/V	—	—	×	EC-500
P1446	1446	VENT CONTROL VALVE	—	—	×	EC-509
P1447	1447	EVAP PURG FLOW/MON	×	×	×*4	EC-516
P1448	1448	VENT CONTROL VALVE	—	—	×	EC-522
P1464	1464	FUEL LEVL SEN/CIRC	—	—	×	EC-530
P1480	1480	FAN CONT S/V CIRC	—	—	×	EC-534
P1490	1490	VC/V BYPASS/V	—	—	×	EC-540
P1491	1491	VC CUT/V BYPASS/V	—	—	×	EC-546
P1605	1605	A/T DIAG COMM LINE	—	—	×	EC-554
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	—	—	×	BL-146
P1706	1706	P-N POS SW/CIRCUIT	—	—	×	EC-555
P1716	1716	TURBINE REV S/CIRC	—	—	×	AT-123
P1720	1720	V/SP SEN (A/T OUT)	—	—	×	EC-561
P1730	1730	A/T INTERLOCK	—	—	×	AT-129
P1752	1752	I/C SOLENOID/CIRC	—	—	×	AT-138
P1754	1754	I/C SOLENOID FNCTN	—	—	×	AT-141
P1757	1757	FR/B SOLENOID/CIRC	—	—	×	AT-144
P1759	1759	FR/B SOLENOID FNCT	—	—	×	AT-147
P1762	1762	D/C SOLENOID/CIRC	—	—	×	AT-150
P1764	1764	D/C SOLENOID FNCTN	—	—	×	AT-153

DTC*1		Items (CONSULT-II screen terms)	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CONSULT-II GST*2	ECM*3					
P1767	1767	HLR/C SOL/CIRC	—	—	×	AT-156
P1769	1769	HLR/C SOL/FNCTN	—	—	×	AT-159
P1772	1772	LC/B SOLENOID/CIRC	—	—	×	AT-162
P1774	1774	LC/B SOLENOID FNCT	—	—	×	AT-165
P1780	1780	SHIFT SIG FNCTN	—	—	×	EC-563
P1805	1805	BRAKE SW/CIRCUIT	—	—	×	EC-565

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: These are not displayed with GST.
*5: The trouble shooting for this DTC needs CONSULT-II.
*6: 1st trip DTC will not be displayed for type II and type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .).

NOTE:
Regarding F50 models, “B1” or “BK1” indicates bank 1, “B2” or “BK2” indicates bank 2.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-63 .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-51 . 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 SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. 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-75 . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the problem. 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, P1320, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0100, 1320 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 nor-**

mal. 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	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	1t

SEF992X

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-122 .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
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 “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-63 .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

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

SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	1	EVAP control system (small leak) (negative pressure)	P0440
	—	EVAP control system (small leak) (positive pressure)	P1440*1
	2	EVAP control system purge flow monitoring	P1447
HO2S	2	Heated oxygen sensor 1 (circuit)	P0130, P0150
		Heated oxygen sensor 1 (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (high voltage)	P0140, P0160
HO2S HTR	2	Heated oxygen sensor 1 heater	P0135, P0155
		Heated oxygen sensor 2 heater	P0141, P0161

*1: P1440 [EVAP control system (small leak) (positive pressure) diagnosis] is one type of SRT related diagnosis. This diagnosis, however, does not contribute to setting the SRT as “CMPLT”, when no malfunction exists in the EVAP system. Therefore, P0440 must be used instead of P1440.

*2: 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 ← ON →	OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

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

NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

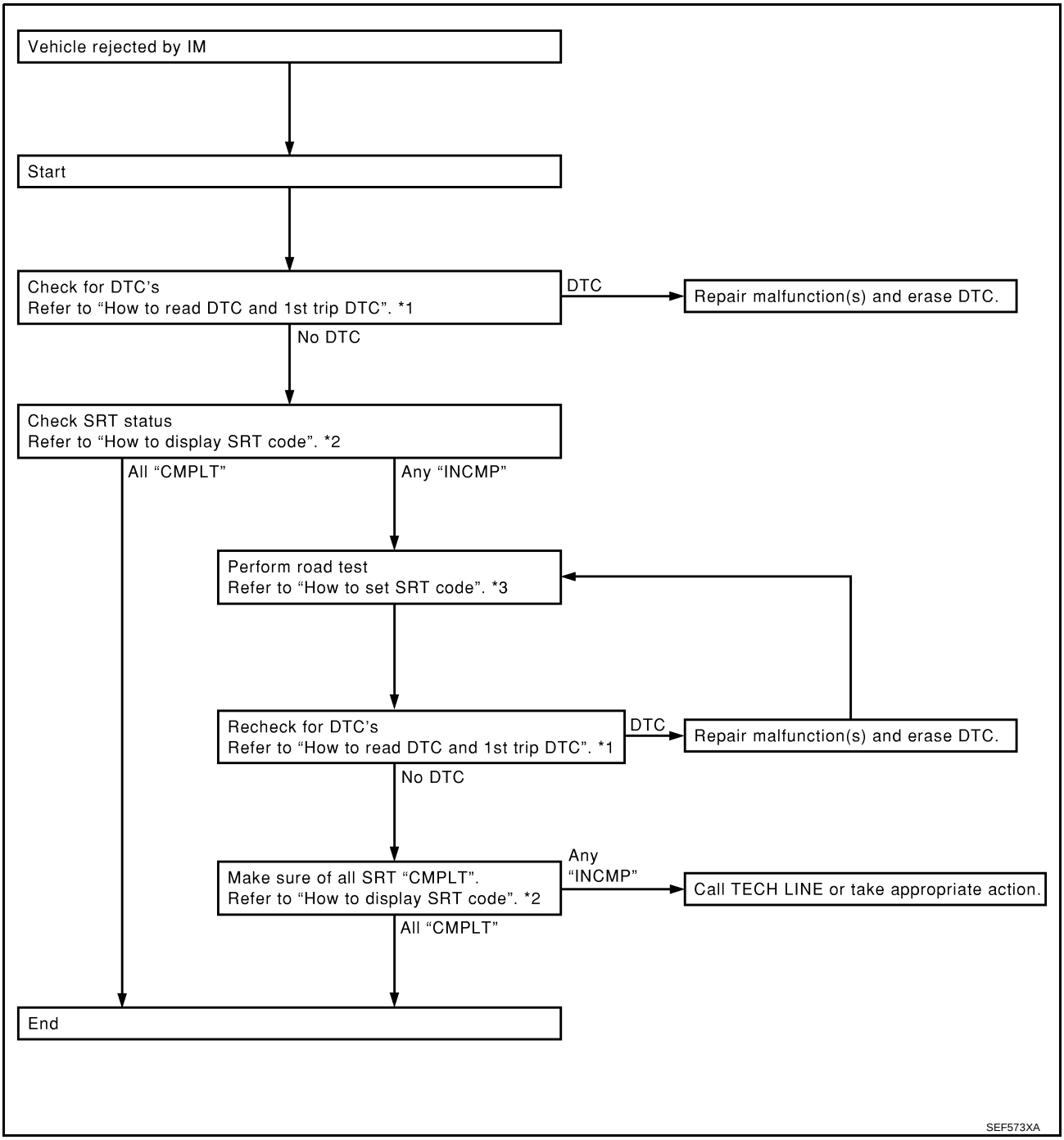
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

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

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

SRT Service Procedure

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



*1 EC-54 *2 EC-59 *3 EC-57

How to Display SRT Code

With CONSULT-II

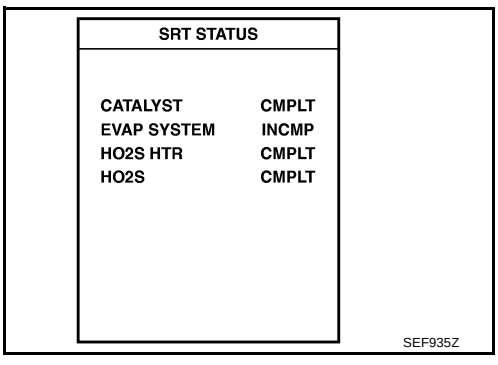
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

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)

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.

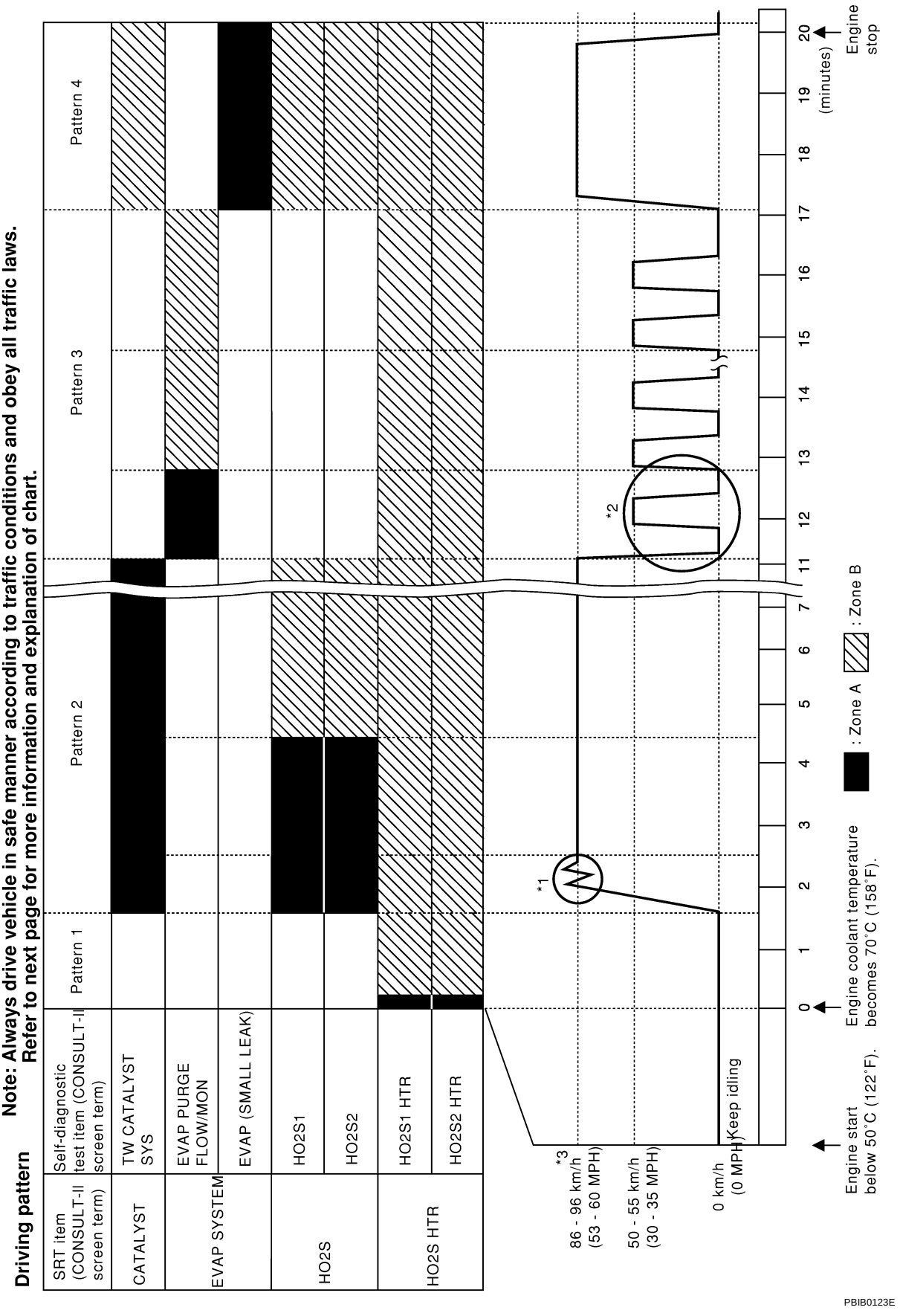
With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-57 .

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



- 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 121 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 121 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 92 and ground is less than 4.1V).**

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.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

Pattern 4:

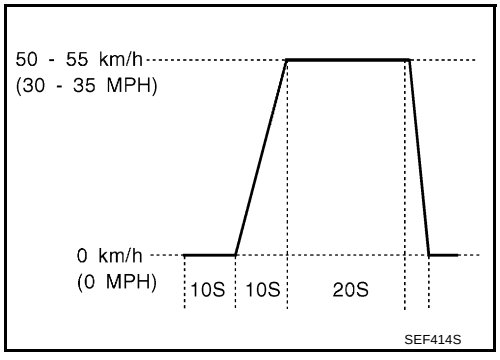
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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: Operate the vehicle in the following driving pattern.

1. Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2. Repeat driving pattern shown at right at least 10 times.

– **During acceleration, hold the accelerator pedal as steady as possible.**



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

Suggested Transmission Gear Position for A/T Models

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

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

The following is the information specified in Mode 6 of SAE J1979.
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 (30 test 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 (Bank1)	01H	01H	Max.	×
	Three way catalyst function (Bank2)	03H	02H	Max.	×
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	×
	EVAP control system purge flow monitoring	06H	83H	Min.	×
HO2S	Heated oxygen sensor 1 (Bank 1)	09H	04H	Max.	×
		0AH	84H	Min.	×
		0BH	04H	Max.	×
		0CH	04H	Max.	×
		0DH	04H	Max.	×
	Heated oxygen sensor 1 (Bank 2)	11H	05H	Max.	×
		12H	85H	Min.	×
		13H	05H	Max.	×
		14H	05H	Max.	×
		15H	05H	Max.	×
	Heated oxygen sensor 2 (Bank 1)	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×
	Heated oxygen sensor 2 (Bank 2)	21H	87H	Min.	×
		22H	87H	Min.	×
		23H	07H	Max.	×
		24H	07H	Max.	×
HO2S HTR	Heated oxygen sensor 1 heater (Bank 1)	29H	08H	Max.	×
		2AH	88H	Min.	×
	Heated oxygen sensor 1 heater (Bank 2)	2BH	09H	Max.	×
		2CH	89H	Min.	×
	Heated oxygen sensor 2 heater (Bank 1)	2DH	0AH	Max.	×
		2EH	8AH	Min.	×
	Heated oxygen sensor 2 heater (Bank 2)	2FH	0BH	Max.	×
		30H	8BH	Min.	×

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

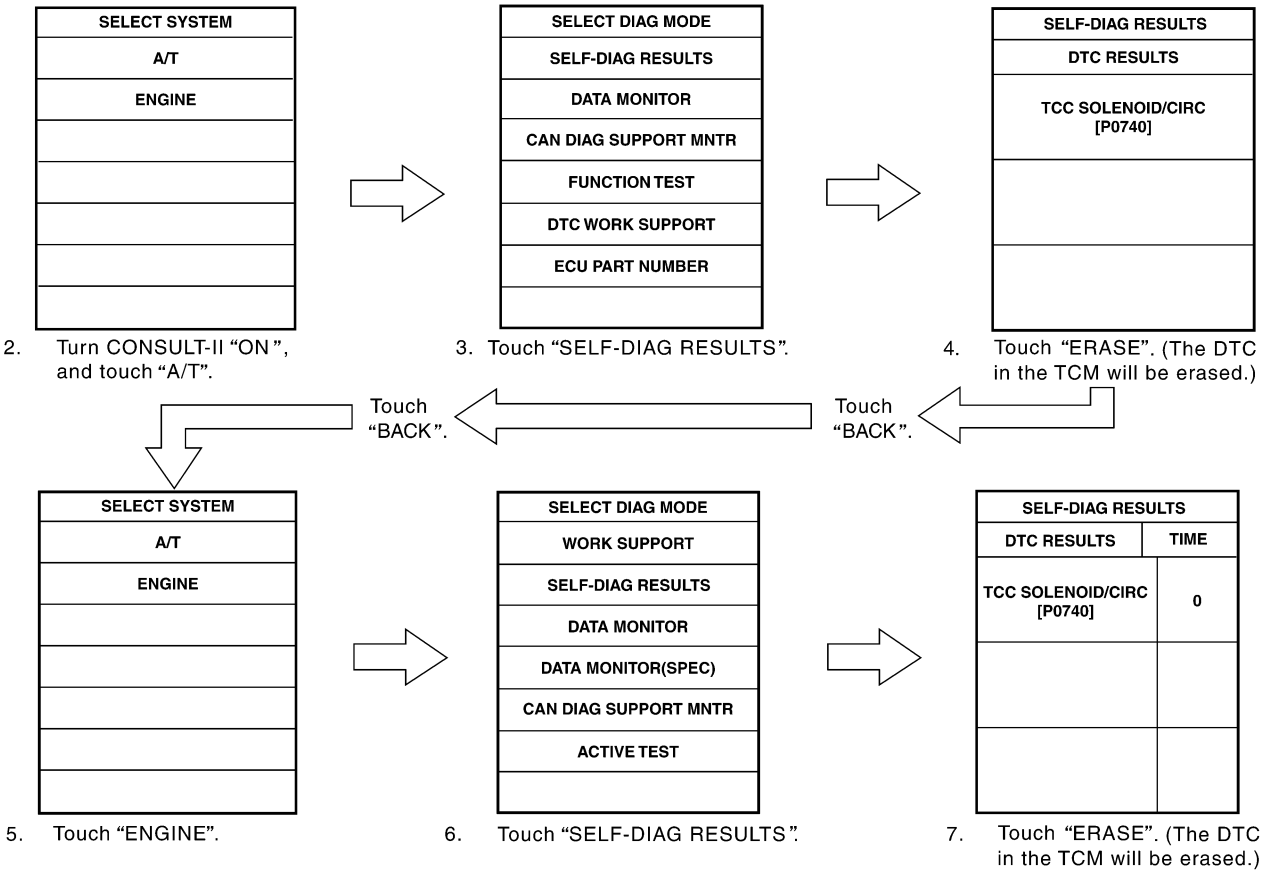
The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

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.



SCIA5671E

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.
2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT 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-67, "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.**

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values
7. 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.

IVIS (Infiniti Vehicle Immobilizer System — NATS)

EBS001FD

- **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-146, "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)" .**
- **Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (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 IVIS (NATS) initialization and IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.**

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

SEF543X

Malfunction Indicator Lamp (MIL)

EBS001FE

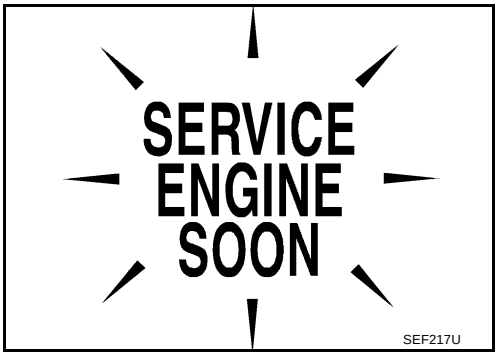
DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

- If the MIL does not light up, refer to DI-27, "WARNING LAMPS" , or see EC-412 .

2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



SEF217U

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 MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● “Misfire (Possible three way catalyst damage)” ● “Closed loop control” ● Fail-safe mode
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.

MIL Flashing without DTC

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. EC-67, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
How to switch the diagnostic test (function) modes, and details of the above functions are described later.EC-67 .
The following emission-related diagnostic information is cleared when the ECM memory is erased.

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values
7. 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”.**

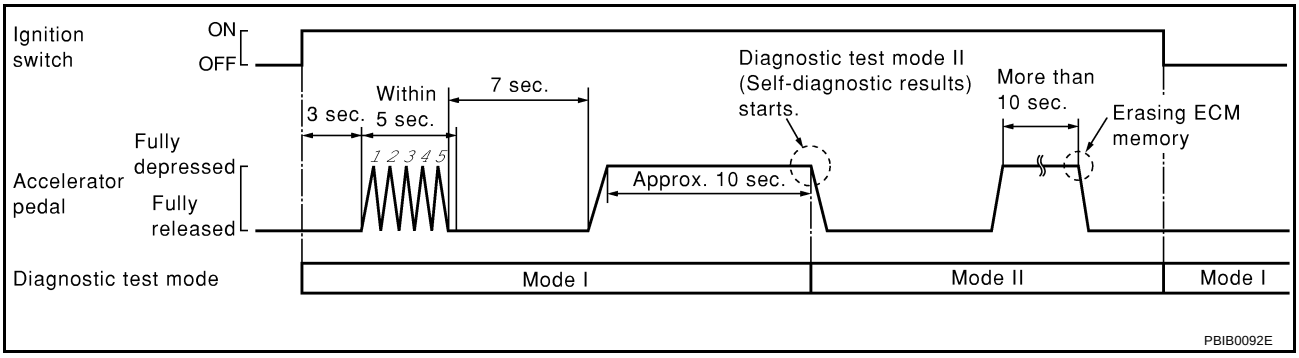
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

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

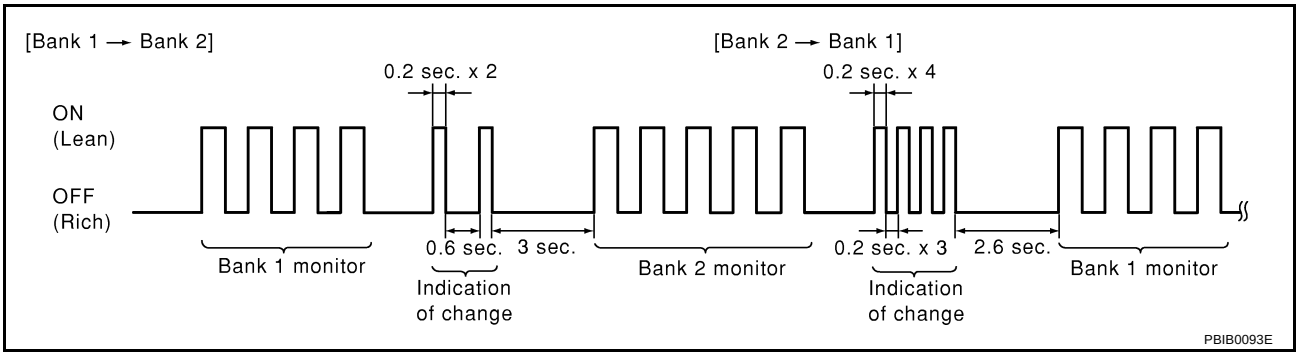


How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-67, "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).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor.

How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa

1. Fully depress the accelerator pedal quickly and then release it immediately.
2. Make sure that monitoring sensor has changed by MIL blinking as follows.



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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-67, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-27, "WARNING LAMPS" or see EC-412 .

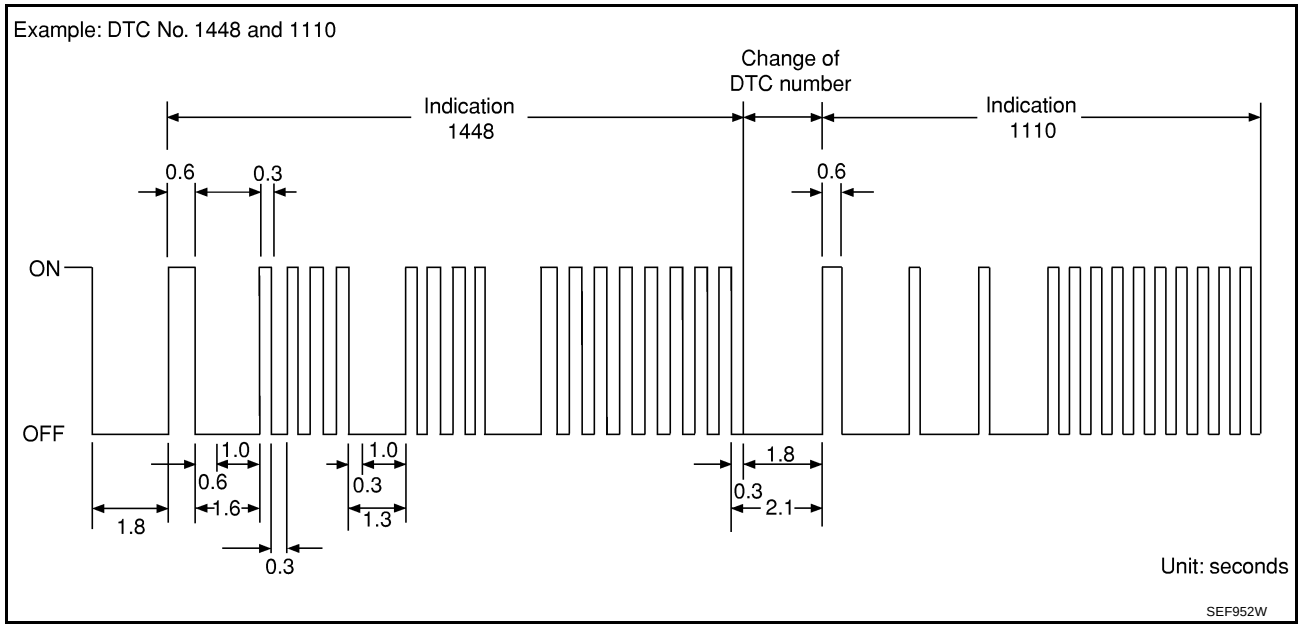
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
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 MIL as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-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-67, "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 MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	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 MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

EBS001FF

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

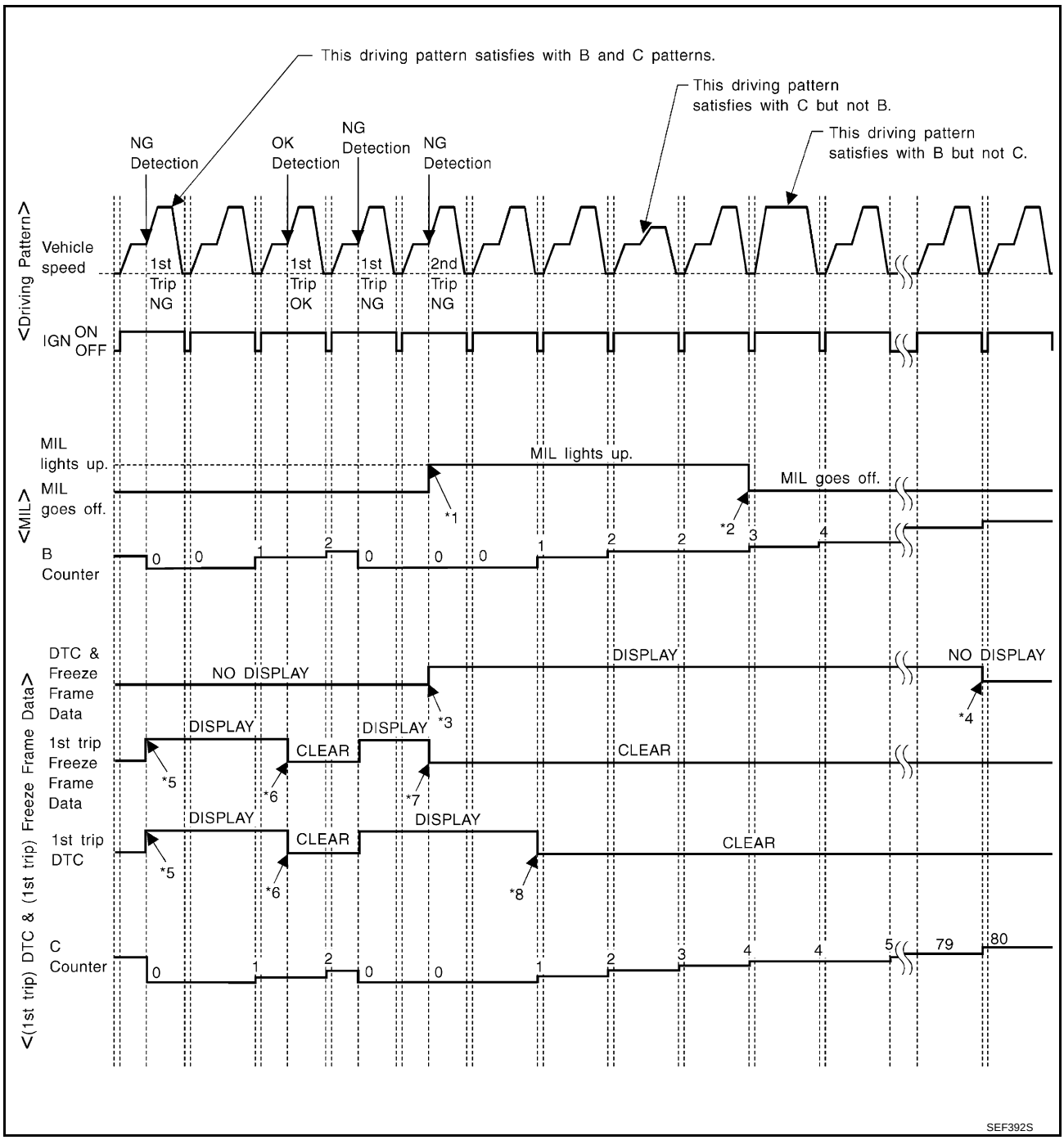
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-50, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-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
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-71 .
For details about patterns “A” and “B” under “Other”, see EC-73 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

<Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

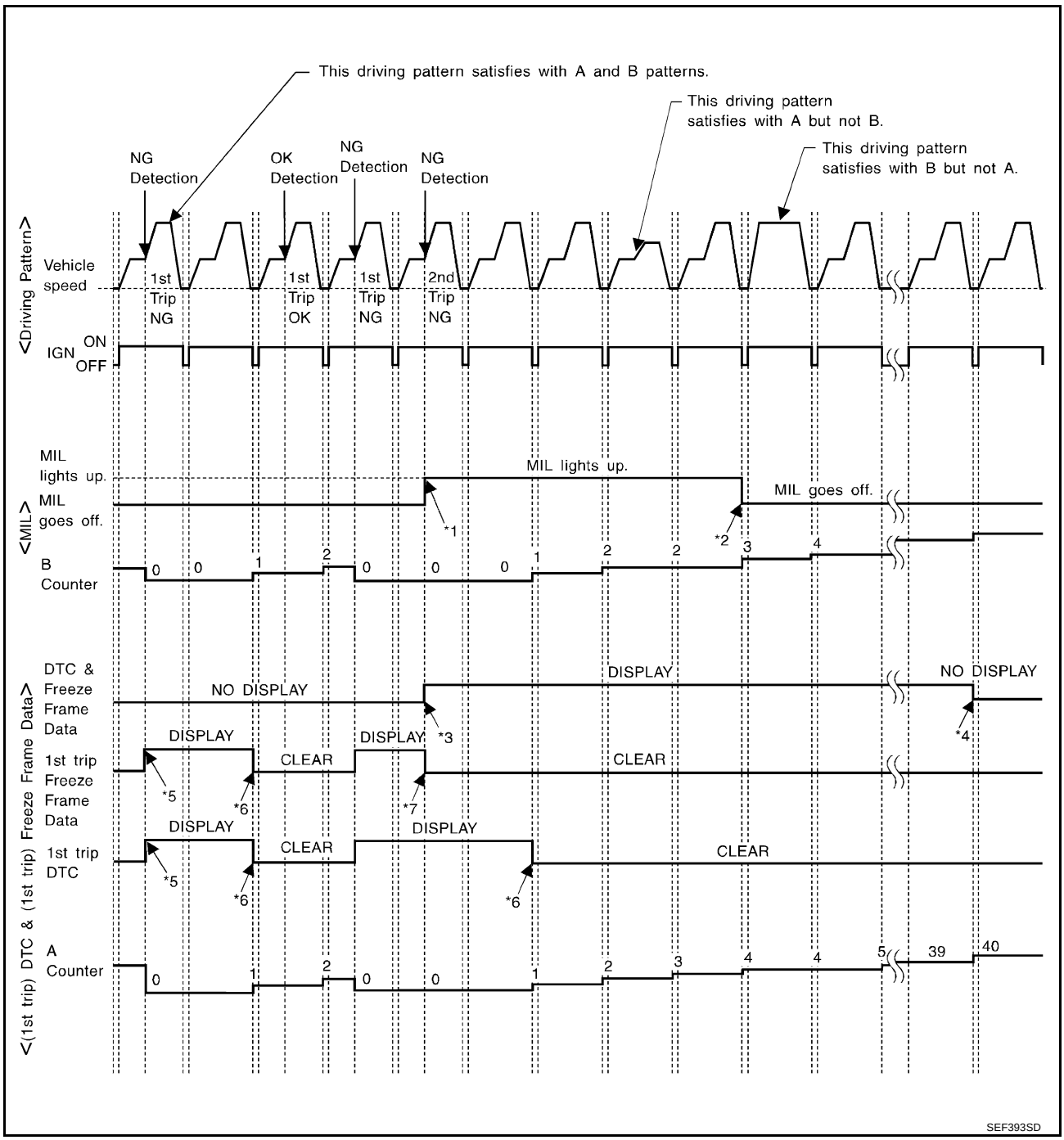
1. The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
   Engine coolant temperature (T) condition:

- 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 (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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



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

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

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

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

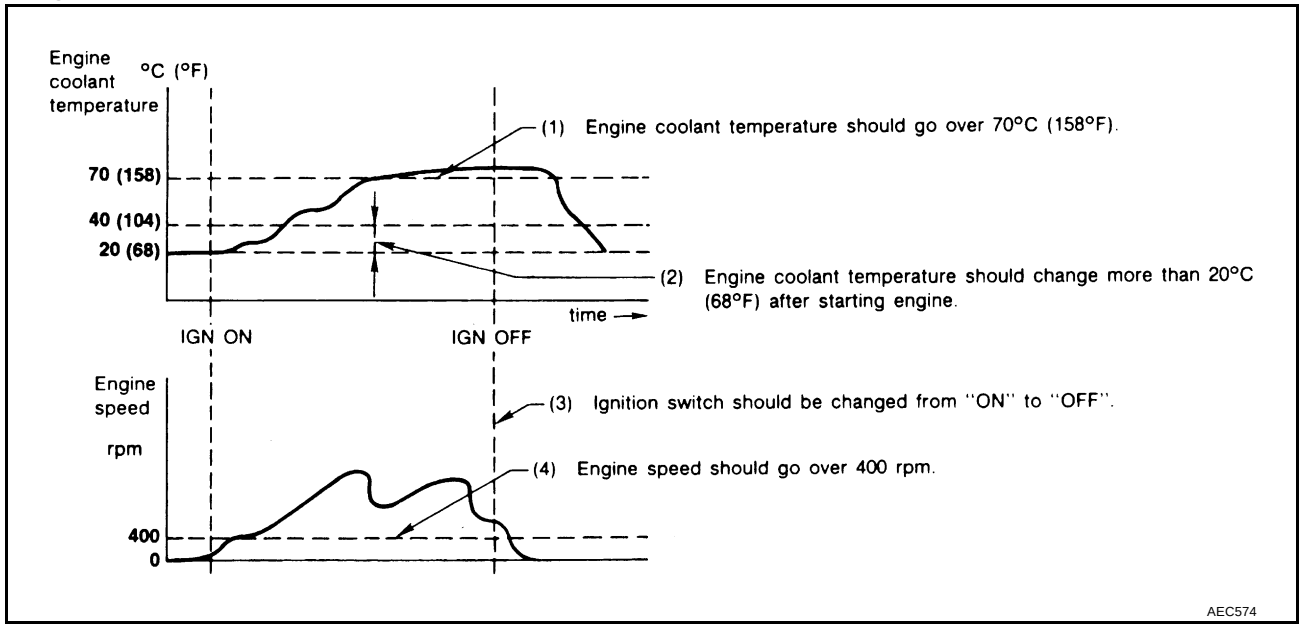
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

<Driving Pattern A>



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

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

TROUBLE DIAGNOSIS

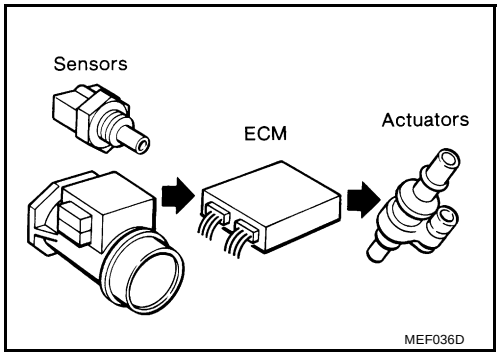
PFP:00004

Trouble Diagnosis Introduction

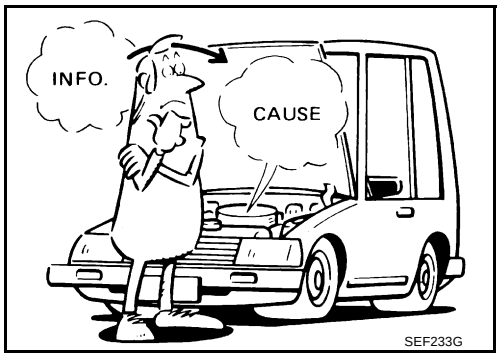
EBS000QB

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 problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.



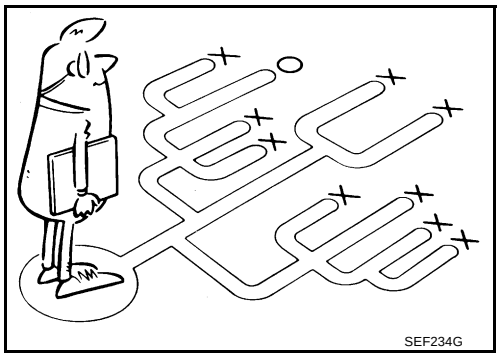
It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-75 .

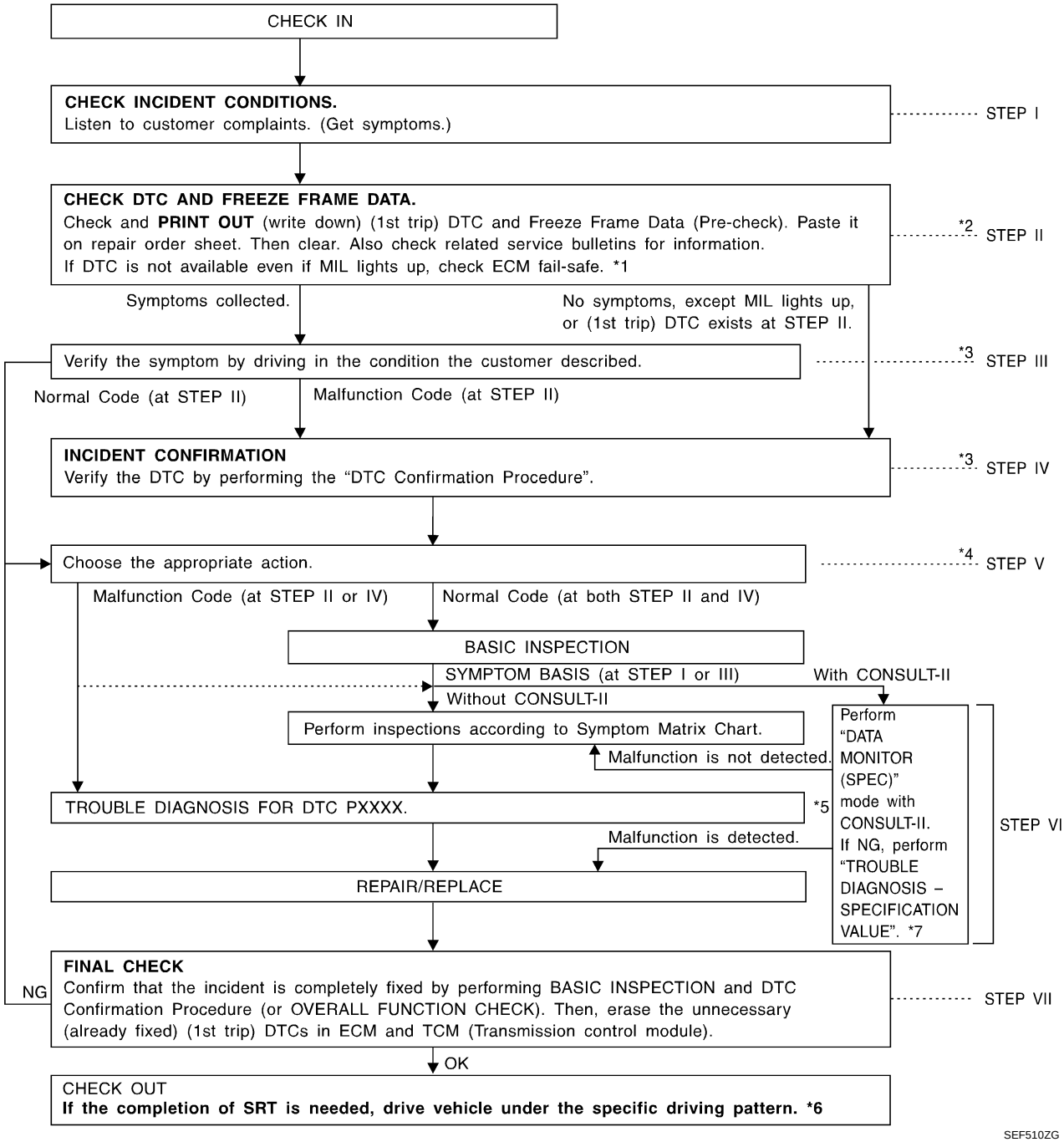
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example EC-77 should be used.

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



WORK FLOW

Flow Chart



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*1 EC-80

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the incident cannot be verified, perform EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-143, "POWER SUPPLY CIRCUIT FOR ECM" .

*5 If malfunctioning part cannot be detected, perform EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*6 EC-61

*7 EC-138

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-76 .
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-63 .) 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-142, "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-86 .) Also check related service bulletins for information.
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-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
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-142, "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.
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-82 .) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-86 .)
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-109 , EC-133 . 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-26, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
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-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-37, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORKSHEET

Description

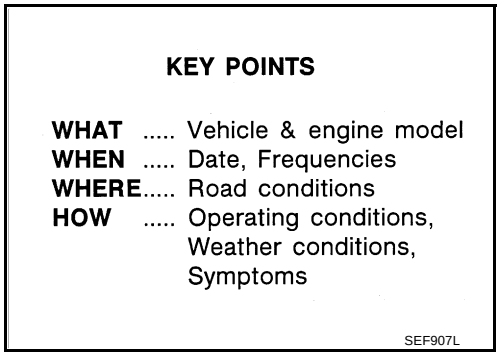
There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

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

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

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

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



- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

EBS000QC

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-151 .

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115 P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0121 Accelerator pedal position sensor ● P0180 Fuel tank temperature sensor ● P0325 P0330 Knock sensor ● P0335 P1336 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0460 P0461 P0464 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P0705 Park/Neutral position sensor ● P1320 Ignition signal ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch ● P1716 Turbine revolution sensor

Priority	Detected items (DTC)
2	● P0105 Absolute pressure sensor ● P0130-P0134, P0150-P0154 Heated oxygen sensor 1 ● P0135 P0155 Heated oxygen sensor 1 heater ● P0137-P0140, P0157-P0160 Heated oxygen sensor 2 ● P0141 P0161 Heated oxygen sensor 2 heater ● P0443 P1444 EVAP canister purge volume control solenoid valve ● P0446 P1446 P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0550 Power steering pressure sensor ● P0650 MIL ● P1065 ECM power supply ● P1111 P1136 Intake valve timing control solenoid valve ● P1119 Radiator coolant temperature sensor ● P1122 Electric throttle control function ● P1123 Throttle control motor relay ● P1140 P1145 Intake valve timing control position sensor ● P1212 VDC/TCS/ABS communication line ● P1220 Fuel pump control module ● P1447 EVAP control system purge flow monitoring ● P1480 Cooling fan speed control solenoid valve ● P1490 P1491 Vacuum cut valve bypass valve ● P1720 Vehicle speed sensor (A/T output) ● P1805 Brake switch
3	● P0171 P0172 P0174 P0175 Fuel injection system function ● P0300 - P0308 Misfire ● P0420 P0430 Three way catalyst function ● P0440 P1440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 Idle speed control system ● P1110 P1135 Intake valve timing control ● P1121 Electric throttle control actuator ● P1148 P1168 Closed loop control ● P1211 VDC/TCS/ABS control unit ● P1217 Engine over temperature (OVERHEAT) ● P1780 Shift change signal

Fail-safe Chart

EBS000QD

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

<table>
<tr><th>DTC No.</th><th colspan="2">Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0100</td><td colspan="2">Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="5">P0115</td><td colspan="2" rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">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.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td rowspan="6">P0120</td><td rowspan="6">Throttle position sensor circuit</td><td>Malfunction A*1
Malfunction B*1
Malfunction C*1*2</td><td colspan="2">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.
Therefore, the acceleration will be poor.</td></tr>
<tr><td>Malfunction D*1</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
When the accelerator pedal depressed value reaches a throttle opening of 30 degrees or more, the throttle valve opens to maximum of 20 degrees by the accelerator wire.</td></tr>
<tr><td rowspan="4">Malfunction G</td><td colspan="2">ECM controls the electric throttle control actuator by regulating the throttle opening to small range.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P0121</td><td>Accelerator pedal position sensor circuit</td><td>Malfunction A*1
Malfunction B*1
Malfunction C*1</td><td colspan="2">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.
Therefore, the acceleration will be poor.</td></tr>
</table>

<table>
<tr><th>DTC No.</th><th colspan="2">Detected items</th><th>Engine operating condition in fail-safe mode</th></tr>
<tr><td>Unable to access ECM</td><td colspan="2">ECM</td><td>ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and cooling fan operation are controlled under certain limitations.
<table>
<tr><td></td><td>ECM fail-safe operation</td></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset valve</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>Cooling fan</td><td>Cooling fan speed control solenoid valve is “OFF” (Cooling fan operates at the maximum speed when engine is running.)</td></tr>
<tr><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table></td></tr>
</table>

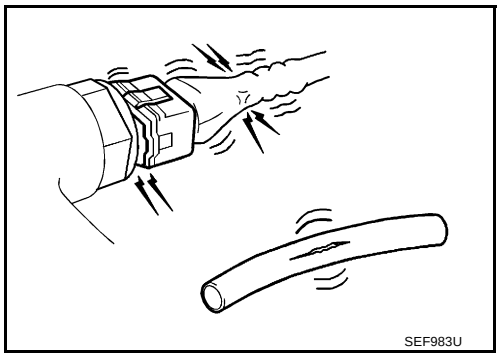
*1: For type II or type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .).
*2: The ECM enters in the fail-safe mode when the normal signal is entered to the ECM after the malfunction C was detected.

Basic Inspection

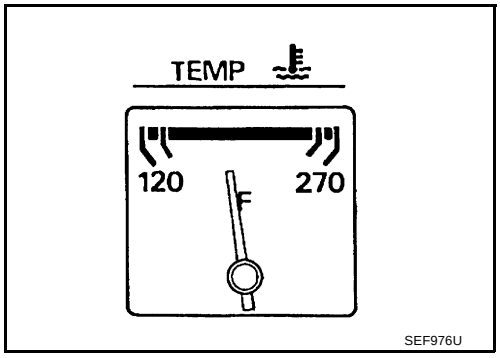
EBS000QE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, 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


SEF983U

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.



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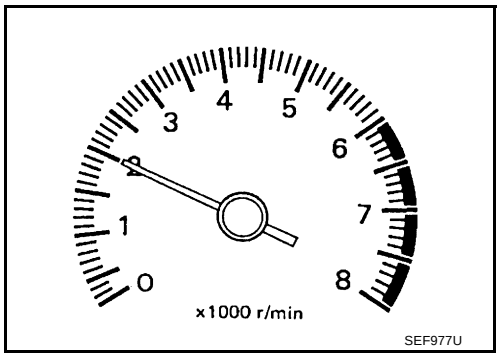
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

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



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2. REPAIR OR REPLACE

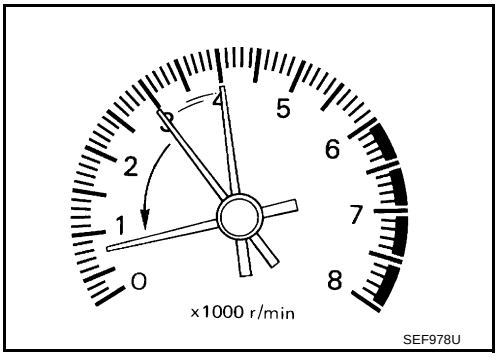
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3

3. CHECK TARGET IDLE SPEED

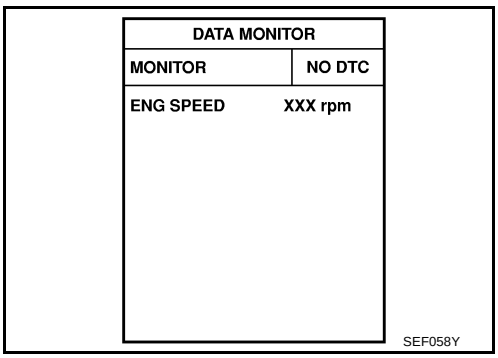
With CONSULT-II

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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-45, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP

CMPLT or INCMP

CMPLT >> GO TO 6.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

6. 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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. refer to EC-340 .
- Check crankshaft position sensor (POS) and circuit. refer to EC-331 , EC-490 .

OK or NG

OK >> GO TO 8.
NG >> 1. Repair or replace.
2. GO TO 4.

8. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .

>> GO TO 4.

9. CHECK IGNITION TIMING

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

17 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

10. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Stop engine.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .

>> GO TO 11.

11. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-45, "Idle Air Volume Learning" .

Which is the result CMPLT or INCMP

CMPLT or INCMP

CMPLT >> GO TO 12.
INCMP >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

12. 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.

650 ± 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.

650 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 13.
NG >> GO TO 15.

13. CHECK IGNITION TIMING AGAIN

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

17 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 14.

14. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-45, "TIMING CHAIN" .

OK or NG

OK >> GO TO 15.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

15. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. refer to EC-340 .
- Check crankshaft position sensor (POS) and circuit. refer to EC-331 , EC-490 .

OK or NG

OK >> GO TO 16.
NG >> 1. Repair or replace.
2. GO TO 4.

16. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.)
2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .

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Symptom Matrix Chart

EBS000QF

SYSTEM — BASIC ENGINE CONTROL SYSTEM

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AA	HARD/NO START/RESTART (EXCP. HA)	1.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Engine coolant temperature sensor circuit	EC-173, EC-193
		2.	Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Crankshaft position sensor (POS) circuit	EC-331, EC-490
				ECM	EC-409, EC-416
				Start signal circuit	EC-588
		3.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
				Incorrect idle speed adjustment	EC-82
			Ignition	Incorrect ignition timing adjustment	EC-82
			Engine control	Camshaft position sensor (PHASE) circuit	EC-340
				Intake valve timing control solenoid valve circuit	EC-429

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AB	ENGINE STALL	1.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
		2.	Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Crankshaft position sensor (POS) circuit	EC-331, EC-490
				Vehicle speed sensor circuit	EC-400, EC-561
				ECM	EC-409, EC-416
				Power steering pressure sensor circuit	EC-404
				Refrigerant pressure sensor circuit	EC-598
		3.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
				Incorrect idle speed adjustment	EC-82
			Ignition	Incorrect ignition timing adjustment	EC-82
			Engine control	Intake valve timing control solenoid valve circuit	EC-429

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AC	HESITATION/SURGING/FLAT SPOT	1.	Ignition	Incorrect ignition timing adjustment	EC-82
		2.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
				Knock sensor circuit	EC-327
				Intake valve timing control solenoid valve circuit	EC-429
		3.	Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Vehicle speed sensor circuit	EC-400, EC-561
				ECM	EC-409, EC-416
				Park/Neutral position switch circuit	EC-555
				Accelerator pedal position sensor circuit	EC-186
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
AD	SPARK KNOCK/DETONATION	1.	Ignition	Incorrect ignition timing adjustment	EC-82
		2.	Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Accelerator pedal position sensor circuit	EC-186
				Radiator coolant temperature sensor circuit	EC-435
				Cooling fan speed control solenoid valve circuit	EC-534
		3.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				ECM	EC-409, EC-416
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AE	LACK OF POWER/POOR ACCELERATION	1.	Ignition	Incorrect ignition timing adjustment	EC-82
			Engine control	Accelerator pedal position sensor circuit	EC-186
				Intake valve timing control solenoid valve circuit	EC-429
				VIAS control solenoid valve circuit	EC-570
		2.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
		3.	Air	Electric throttle control	EC-178, EC-443 , EC-447
			Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Vehicle speed sensor circuit	EC-400, EC-561
				ECM	EC-409, EC-416
				Park/Neutral position switch circuit	EC-555
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
AF	HIGH IDLE/LOW IDLE	1.	Air	Incorrect idle speed adjustment	EC-82
		2.	Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Engine control	Throttle position sensor circuit	EC-178
				Accelerator pedal position sensor circuit	EC-186
		3.	Air conditioner circuit		ATC-32
			Engine control	Engine coolant temperature sensor circuit	EC-173, EC-193
				ECM	EC-409, EC-416
				Intake valve timing control solenoid valve circuit	EC-429
				Refrigerant pressure sensor circuit	EC-598
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AG	ROUGH IDLE/HUNTING	1.	Air	Incorrect idle speed adjustment	EC-82
			Ignition	Incorrect ignition timing adjustment	EC-82
		2.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
				Intake valve timing control solenoid valve circuit	EC-429
		3.	Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	ECM	EC-409, EC-416
				Park/Neutral position switch circuit	EC-555
				Power steering pressure sensor circuit	EC-404
				Electrical load signal circuit	EC-603
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AH	IDLING VIBRATION	1.	Air	Incorrect idle speed adjustment	EC-82
			Ignition	Incorrect ignition timing adjustment	EC-82
		2.	Fuel	Fuel pump circuit	EC-592
				Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
				Intake valve timing control solenoid valve circuit	EC-429
		3.	Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	ECM	EC-409, EC-416
				Park/Neutral position switch circuit	EC-555
				Power steering pressure sensor circuit	EC-404
				Electrical load signal circuit	EC-603
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
AJ	SLOW/NO RETURN TO IDLE	1.	Air	Incorrect idle speed adjustment	EC-82
		2.	Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Engine control	Throttle position sensor circuit	EC-178
				Accelerator pedal position sensor circuit	EC-186
		3.	Air conditioner circuit		ATC-32
			Engine control	Engine coolant temperature sensor circuit	EC-173, EC-193
				ECM	EC-409, EC-416
				Intake valve timing control solenoid valve circuit	EC-429
				Refrigerant pressure sensor circuit	EC-598
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
AK	OVERHEATS/WATER TEMPERATURE HIGH	1.	Engine control	Radiator coolant temperature sensor circuit	EC-435
				Cooling fan speed control solenoid valve circuit	EC-534
		2.	Main power supply and ground circuit		EC-143
		3.	Engine control	ECM	EC-409, EC-416

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AL	EXCESSIVE FUEL CONSUMPTION	1.	Air	Incorrect idle speed adjustment	EC-82
			Ignition	Incorrect ignition timing adjustment	EC-82
		2.	Fuel	Injector circuit	EC-579
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Ignition	Ignition circuit	EC-479
			Engine control	Mass air flow sensor circuit	EC-154
				Heated oxygen sensor 1 circuit	EC-197
				Engine coolant temperature sensor circuit	EC-173, EC-193
				Throttle position sensor circuit	EC-178
		3.	Fuel	Fuel pump circuit	EC-592
			Main power supply and ground circuit		EC-143
			Air conditioner circuit		ATC-32
			Engine control	Vehicle speed sensor circuit	EC-400, EC-561
				Knock sensor circuit	EC-327
				ECM	EC-409, EC-416
				Park/Neutral position switch circuit	EC-555
				Intake valve timing control solenoid valve circuit	EC-429
		4.	Fuel	Fuel pressure regulator system	EC-48
				Evaporative emission system	EC-606
			Air	Positive crankcase ventilation system	EC-619
			Engine control	Refrigerant pressure sensor circuit	EC-598
AM	EXCESSIVE OIL CONSUMPTION	1.	Air	Positive crankcase ventilation system	EC-619
HA	BATTERY DEAD (UNDER CHARGE)	2.	Fuel	Fuel pump circuit	EC-592
			Air	Electric throttle control actuator	EC-178, EC-443 , EC-447
			Air conditioner circuit		ATC-32

SYSTEM — ENGINE MECHANICAL & OTHER

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AA	HARD/NO START/ RESTART (EXCP. HA)	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
			IVIS (Infiniti Vehicle Immobilizer System — NATS)		EC-65 or BL-146
		2.	VDC/TCS/ABS control unit		EC-462 or EC-463 or BRC-11
		3.	Cranking	Starter circuit	SC-20
		4.	Cranking	PNP switch	AT-82
		5.	Fuel	Fuel tank	FL-6
				Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air leakage from air duct (Mass air flow sensor —Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Cranking	Drive plate	EM-67
			Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AB	ENGINE STALL	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
			IVIS (Infiniti Vehicle Immobilizer System — NATS)		EC-65 or BL-146
		2.	VDC/TCS/ABS control unit		EC-462 or EC-463 or BRC-11
		5.	Fuel	Fuel tank	FL-6
				Fuel piping	FL-2
				Vapor lock	—
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AC	HESITATION/SURGING/FLAT SPOT	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
		2.	VDC/TCS/ABS control unit		EC-462 or EC-463 or BRC-11
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AD	SPARK KNOCK/DETONATION	2.	VDC/TCS/ABS control unit		EC-462 or EC-463 or BRC-11
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AE	LACK OF POWER/ POOR ACCELERATION	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
		2.	VDC/TCS/ABS control unit		EC-462 or EC-463 or BRC-11
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	
AF	HIGH IDLE/LOW IDLE	5.	Air	Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AG	ROUGH IDLE/HUNTING	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

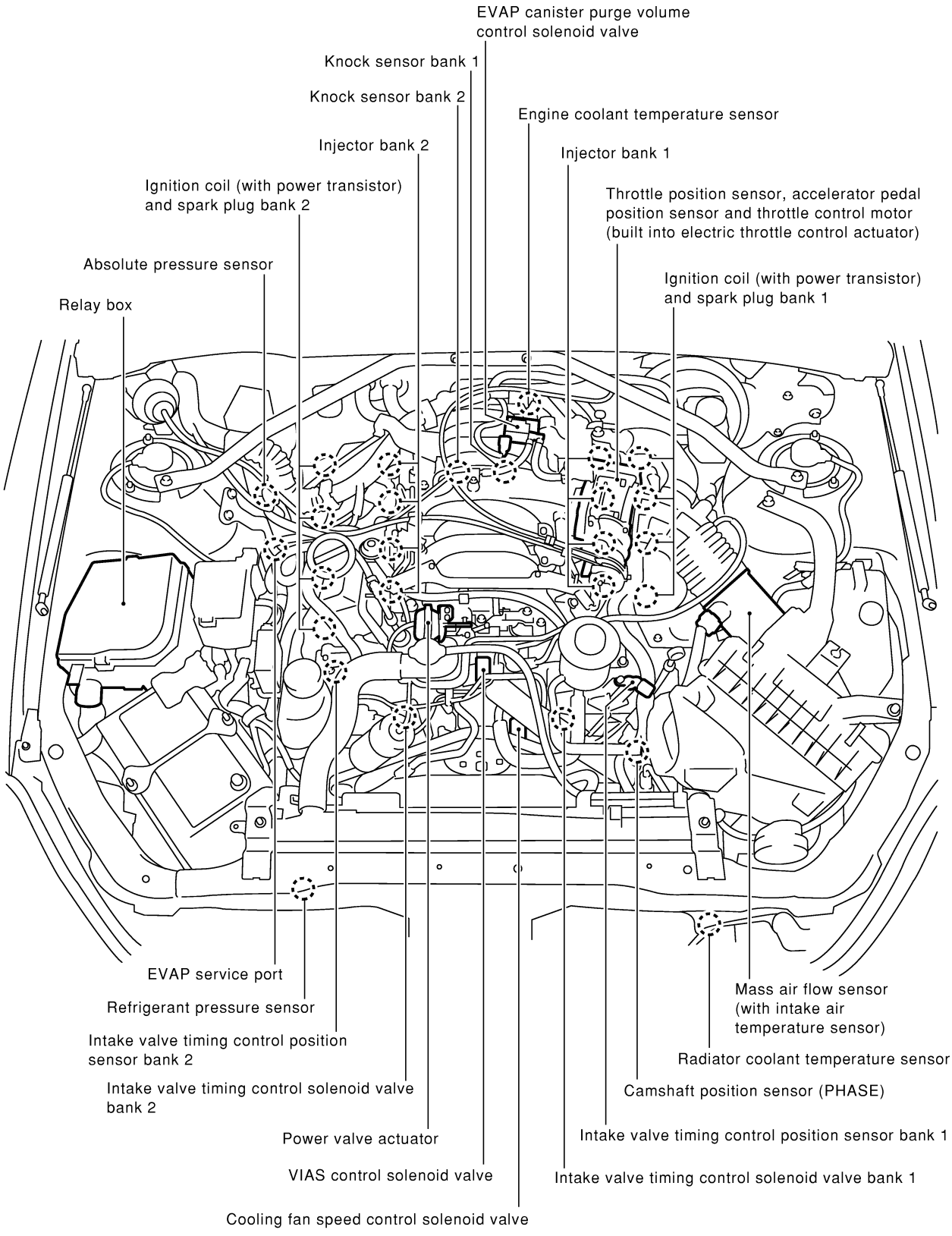
Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AH	IDLING VIBRATION	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	
AJ	HIGH IDLE/LOW IDLE	5.	Air	Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Exhaust	Exhaust manifold/Tube/Muffler/Gasket	EM-22, EX-3
				Three way catalyst	EM-22
			Cooling	Thermostat	CO-23
				Cooling fan	CO-17

Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AK	OVERHEATS/ WATER TEMPERATURE HIGH	4.	Engine	Cylinder head gasket	EM-55
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
AL	EXCESSIVE FUEL CONSUMPTION	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9
		5.	Fuel	Fuel piping	FL-2
				Valve deposit	—
				Poor fuel (Heavy weight gasoline, Low octane)	—
			Air	Air duct	EM-15
				Air cleaner	
				Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator)	EM-15
				Electric throttle control actuator, Throttle wire	EM-17, ACC-2
				Air leakage from intake manifold/Collector/Gasket	EM-17
			Engine	Cylinder head	EM-55
				Cylinder head gasket	
			Valve mechanism	Timing chain	EM-45
				Camshaft	EM-34
				Intake valve	EM-55
				Exhaust valve	
			Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	EM-25, LU-10 , LU-9
				Oil level (Low)/Filthy oil	LU-6
			Cooling	Radiator/Hose/Radiator filler cap	CO-11
				Thermostat	CO-23
				Water pump	CO-21
				Water gallery	CO-7
				Cooling fan	CO-17
				Coolant level (low)/Contaminated coolant	CO-8
		6.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
				Connecting rod	
				Bearing	
				Crankshaft	

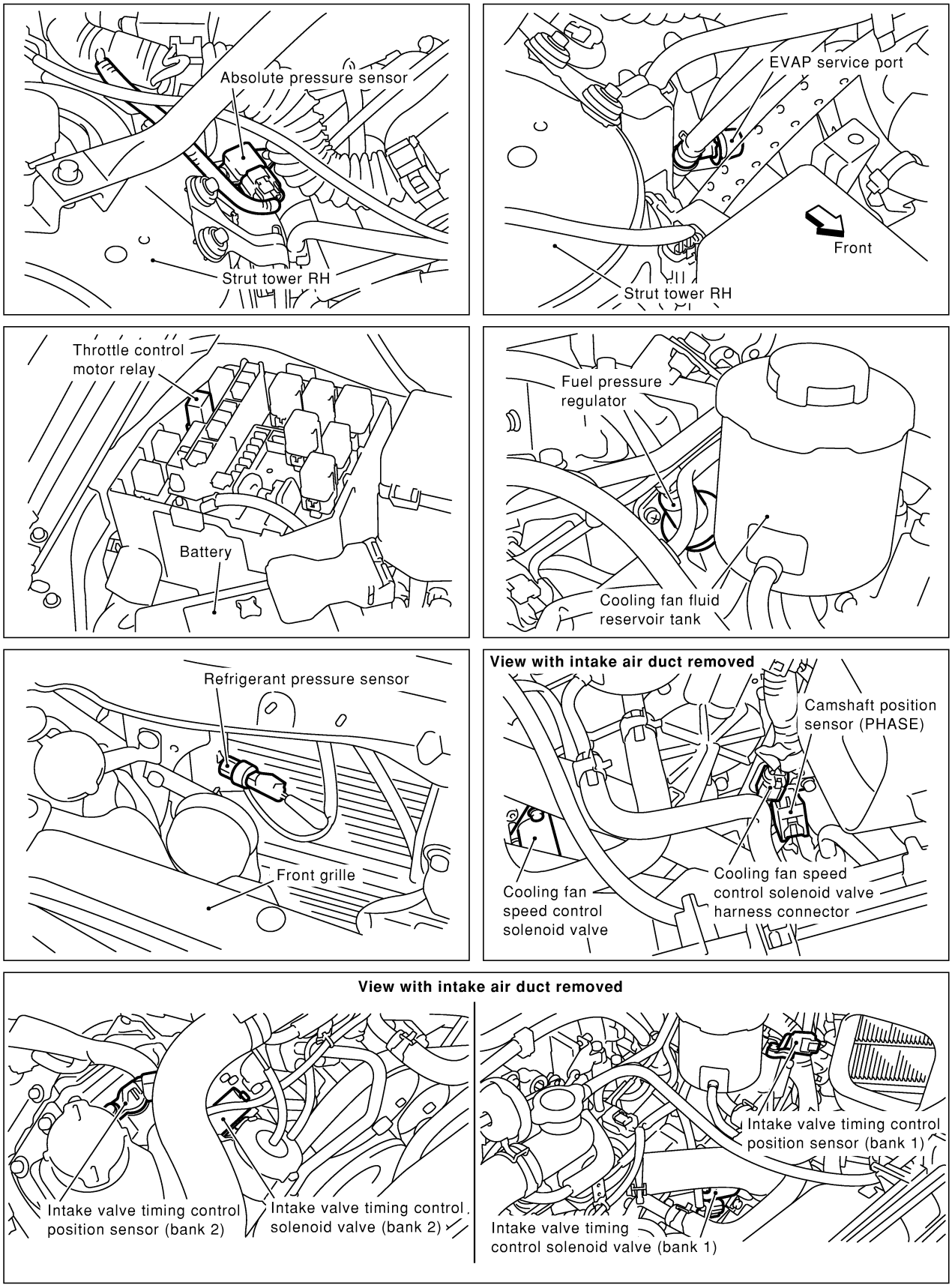
Warranty symptom code	Symptom	Inspection order	Diagnostic Item		Reference Page
AM	EXCESSIVE OIL CONSUMPTION	3.	Engine	Cylinder head gasket	EM-55
			Valve mechanism	Intake valve	EM-55
				Exhaust valve	
		4.	Engine	Cylinder block	EM-67
				Piston	
				Piston ring	
HA	BATTERY DEAD (UNDER CHARGE)	1.	Cranking	Battery	SC-4
				Alternator circuit	SC-9

Engine Control Component Parts Location

EBS000QG

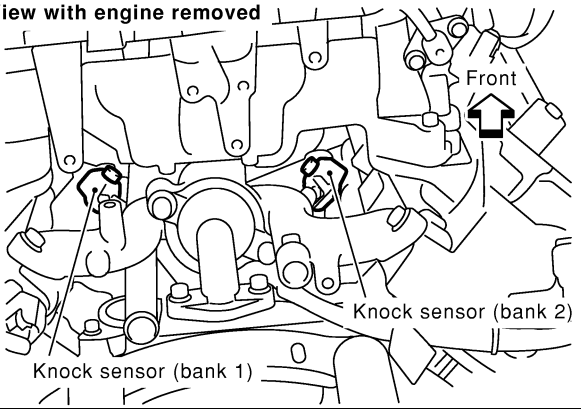


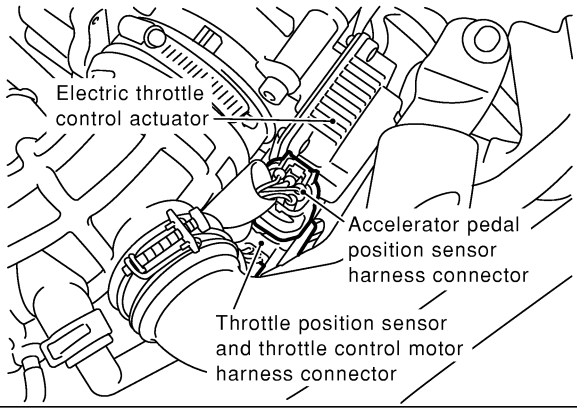
PBIB0001E

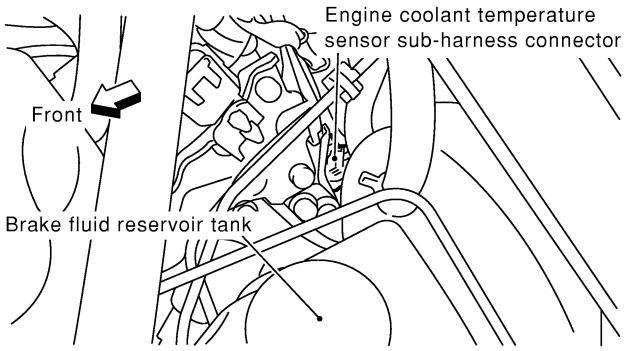

Absolute pressure sensor
Strut tower RH
EVAP service port
Front
Strut tower RH
Throttle control motor relay
Battery
Fuel pressure regulator
Cooling fan fluid reservoir tank
Refrigerant pressure sensor
Front grille
View with intake air duct removed
Camshaft position sensor (PHASE)
Cooling fan speed control solenoid valve harness connector
Cooling fan speed control solenoid valve
View with intake air duct removed
Intake valve timing control position sensor (bank 2)
Intake valve timing control solenoid valve (bank 2)
Intake valve timing control position sensor (bank 1)
Intake valve timing control solenoid valve (bank 1)

PBIB0002E

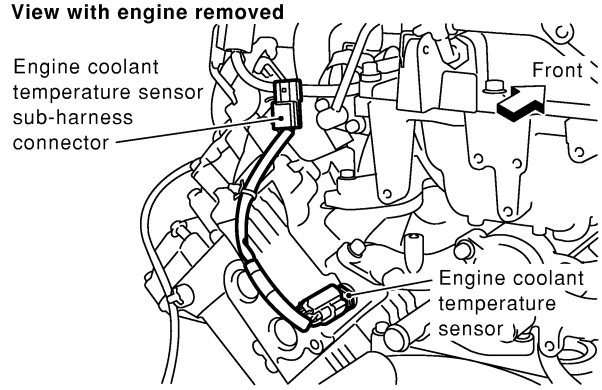
View with engine removed



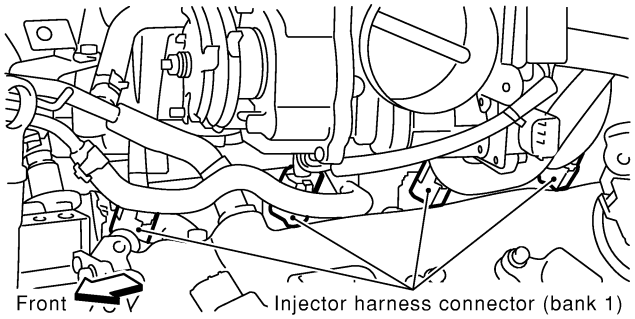


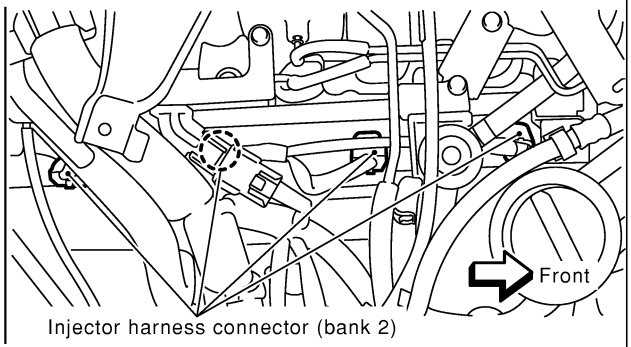


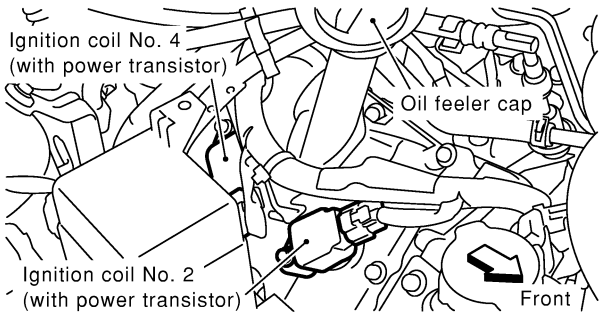
View with engine removed

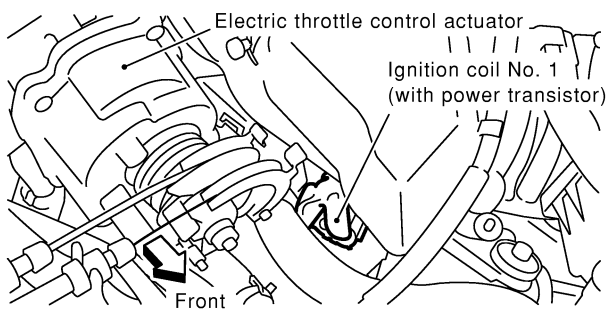


View with engine removed

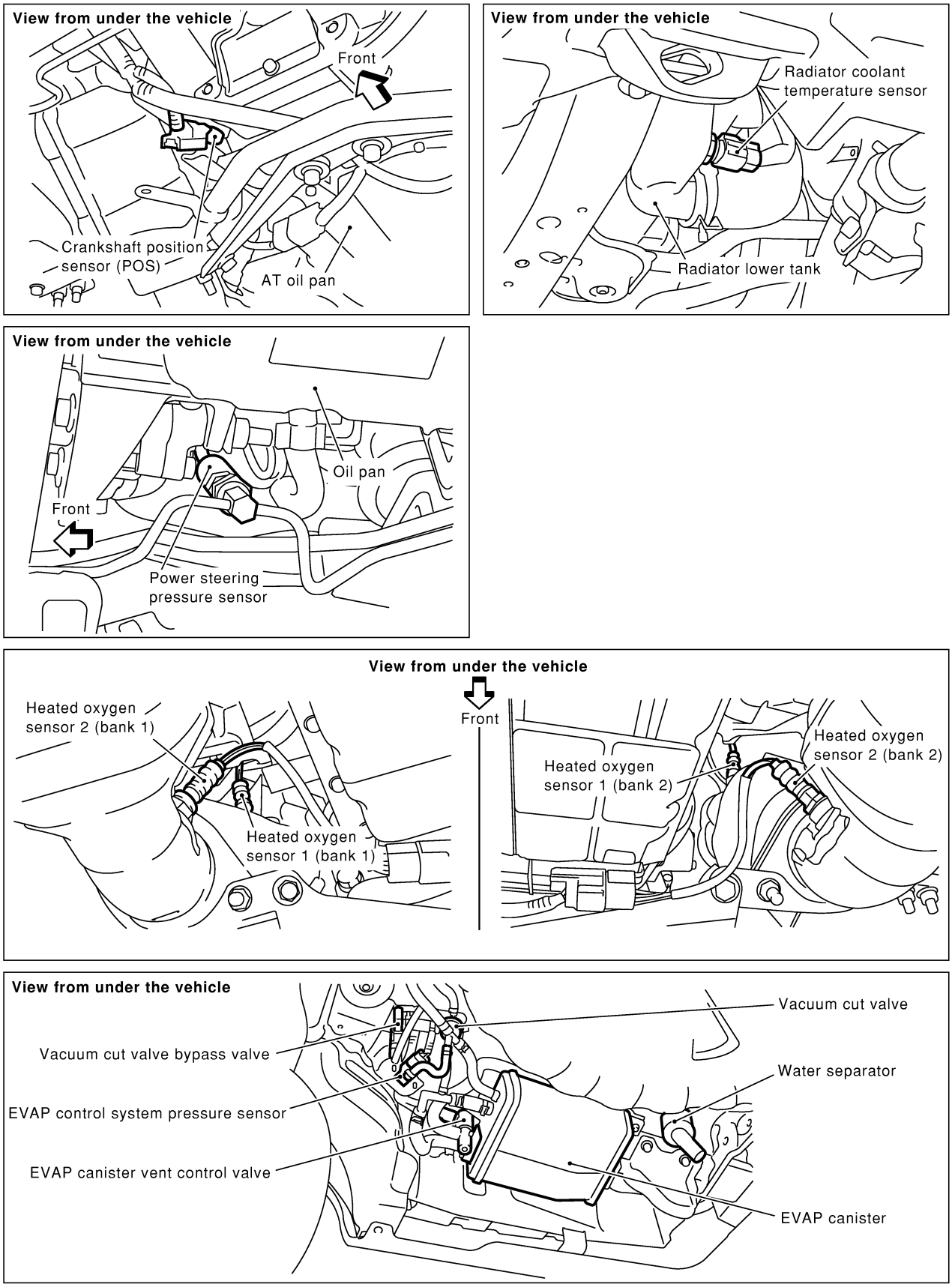






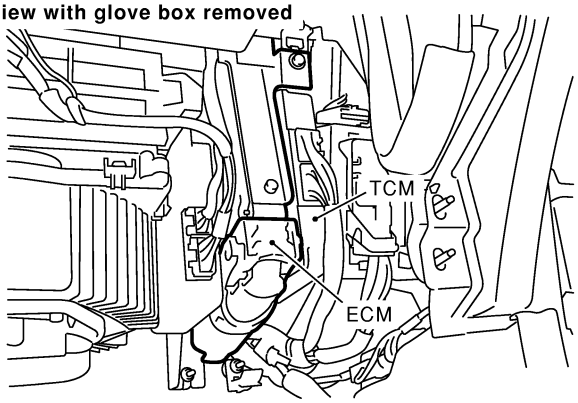


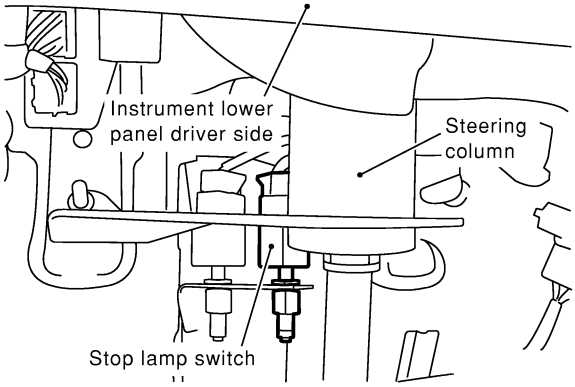
PBIB0003E

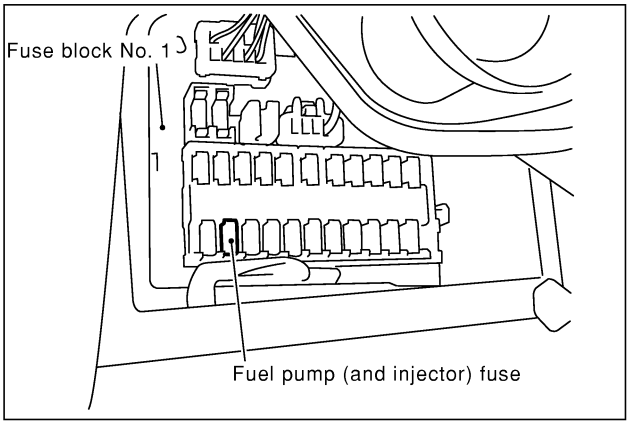

View from under the vehicle
Front
Crankshaft position sensor (POS)
AT oil pan
View from under the vehicle
Radiator coolant temperature sensor
Radiator lower tank
View from under the vehicle
Oil pan
Front
Power steering pressure sensor
View from under the vehicle
Front
Heated oxygen sensor 2 (bank 1)
Heated oxygen sensor 1 (bank 1)
Heated oxygen sensor 1 (bank 2)
Heated oxygen sensor 2 (bank 2)
View from under the vehicle
Vacuum cut valve
Vacuum cut valve bypass valve
Water separator
EVAP control system pressure sensor
EVAP canister vent control valve
EVAP canister

PBIB0004E

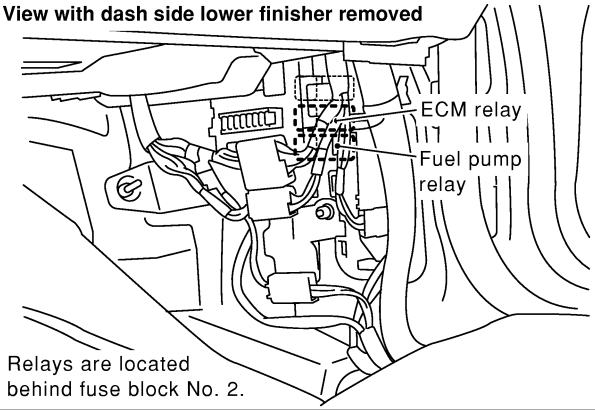
View with glove box removed



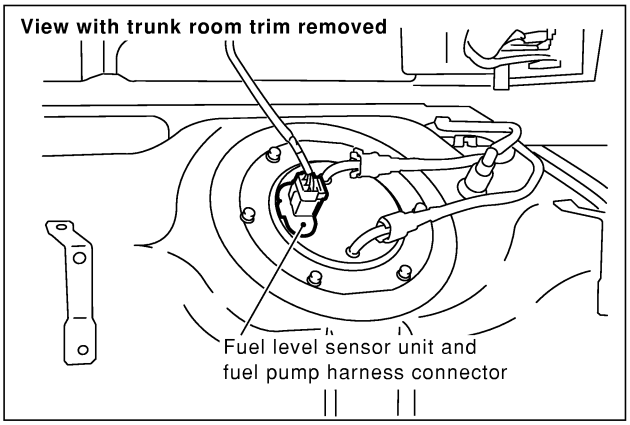




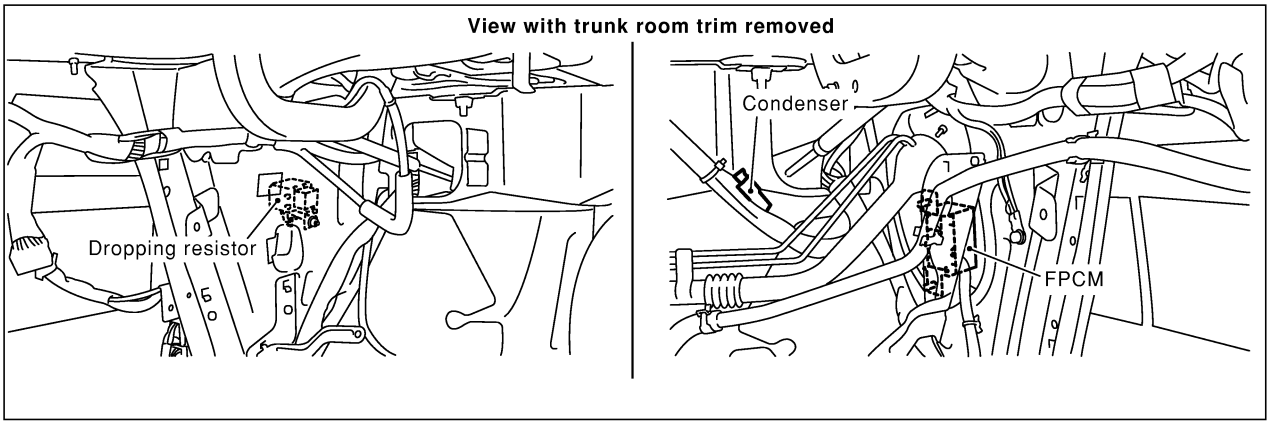
View with dash side lower finisher removed



View with trunk room trim removed



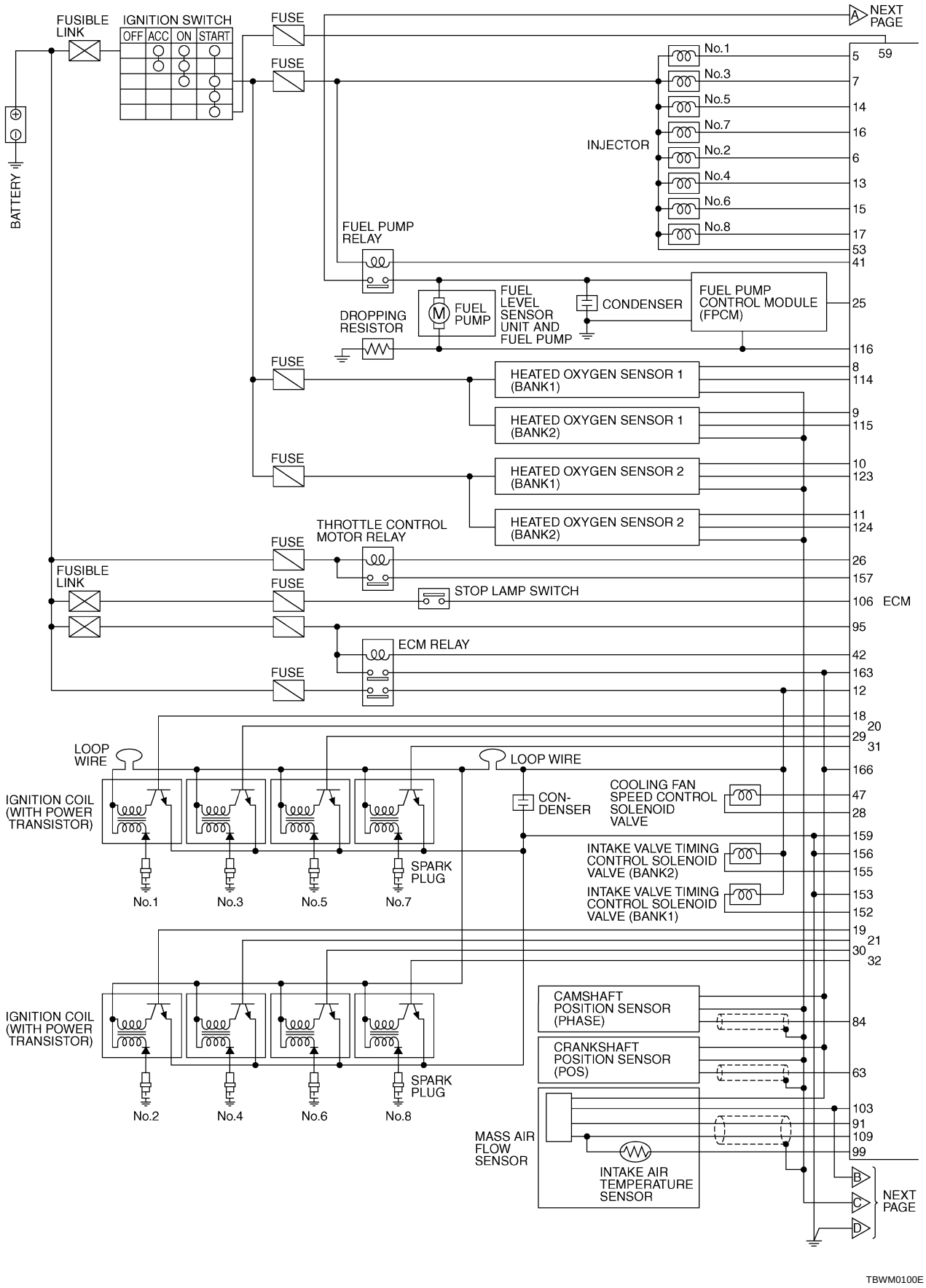
View with trunk room trim removed

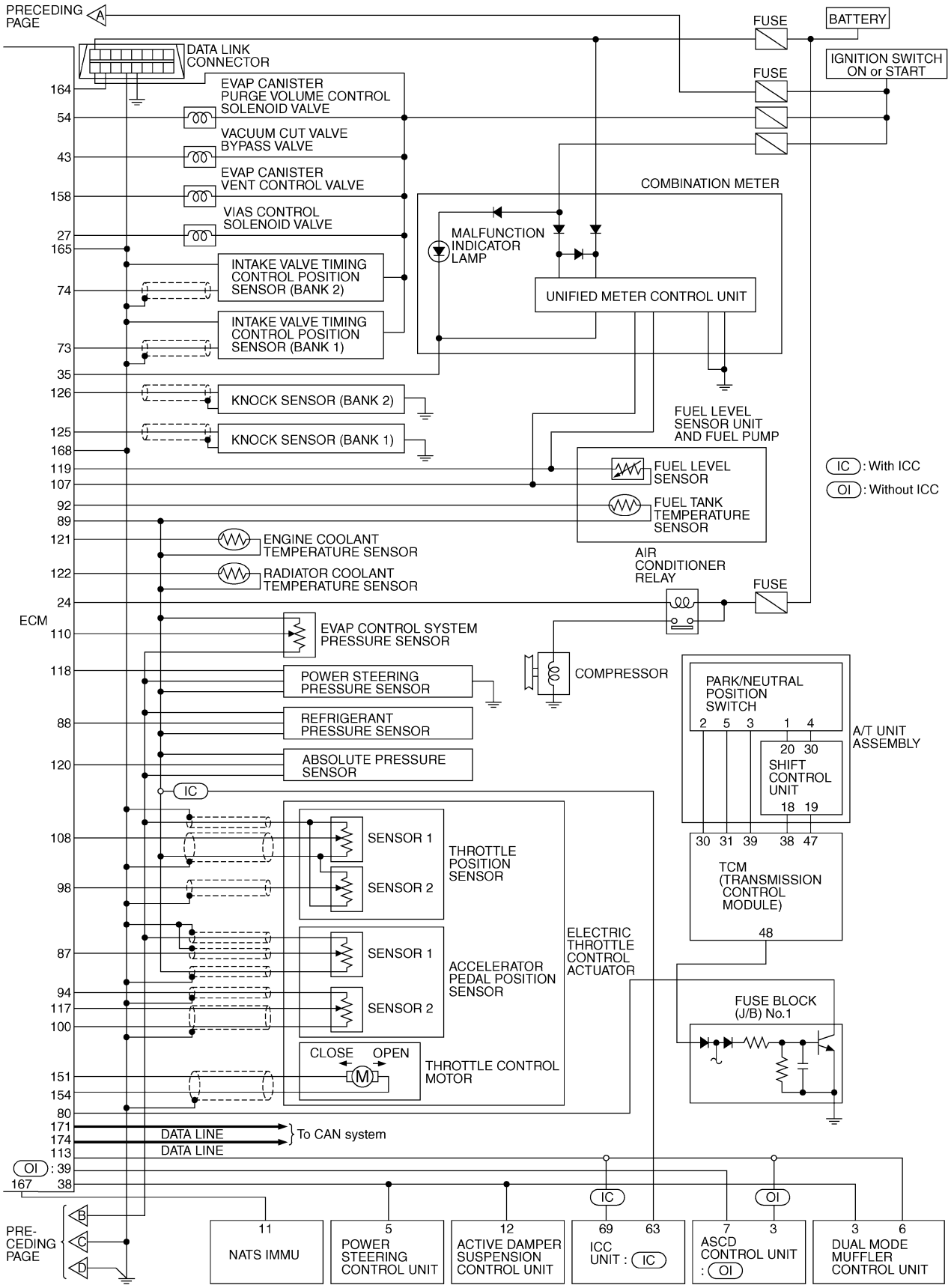


PBIB0005E

Circuit Diagram

EBS000QH

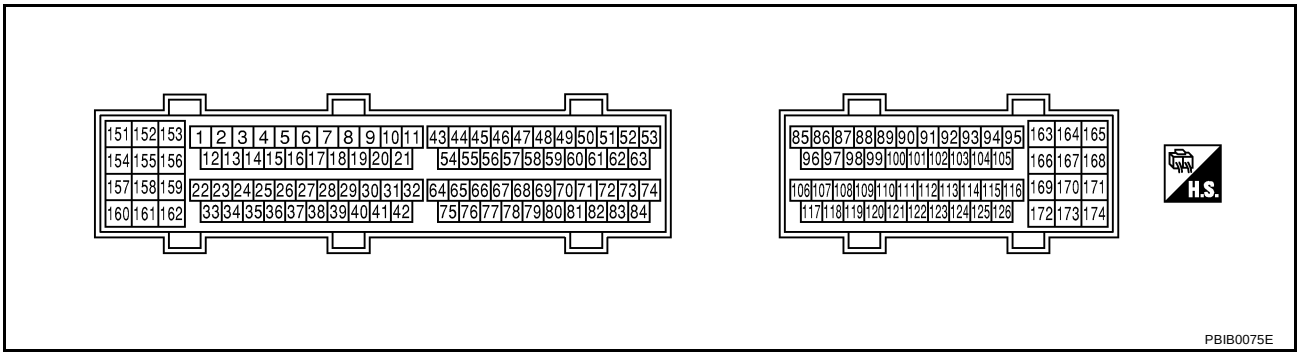



PRECEDING PAGE
A
DATA LINK CONNECTOR
FUSE
BATTERY
IGNITION SWITCH ON or START
FUSE
164
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
54
VACUUM CUT VALVE BYPASS VALVE
43
EVAP CANISTER VENT CONTROL VALVE
158
VIAS CONTROL SOLENOID VALVE
27
COMBINATION METER
165
MALFUNCTION INDICATOR LAMP
INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)
74
UNIFIED METER CONTROL UNIT
INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 1)
73
35
126
KNOCK SENSOR (BANK 2)
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
125
KNOCK SENSOR (BANK 1)
168
119
FUEL LEVEL SENSOR
IC : With ICC
107
OI : Without ICC
92
FUEL TANK TEMPERATURE SENSOR
89
121
ENGINE COOLANT TEMPERATURE SENSOR
AIR CONDITIONER RELAY
122
RADIATOR COOLANT TEMPERATURE SENSOR
FUSE
24
ECM
110
EVAP CONTROL SYSTEM PRESSURE SENSOR
COMPRESSOR
118
POWER STEERING PRESSURE SENSOR
PARK/NEUTRAL POSITION SWITCH
2 5 3 1 4
88
REFRIGERANT PRESSURE SENSOR
A/T UNIT ASSEMBLY
20 30
120
ABSOLUTE PRESSURE SENSOR
SHIFT CONTROL UNIT
18 19
IC
30 31 39 38 47
108
SENSOR 1
THROTTLE POSITION SENSOR
TCM (TRANSMISSION CONTROL MODULE)
98
SENSOR 2
48
87
SENSOR 1
ACCELERATOR PEDAL POSITION SENSOR
ELECTRIC THROTTLE CONTROL ACTUATOR
94
117
SENSOR 2
FUSE BLOCK (J/B) No.1
100
CLOSE OPEN
151
M
THROTTLE CONTROL MOTOR
154
80
171
DATA LINE
To CAN system
174
DATA LINE
113
OI : 39
167 38
IC
OI
PRE-CEDING PAGE
B
C
D
11
NATS IMMU
5
POWER STEERING CONTROL UNIT
12
ACTIVE DAMPER SUSPENSION CONTROL UNIT
69 63
ICC UNIT : IC
7 3
ASCD CONTROL UNIT : OI
3 6
DUAL MODE MUFFLER CONTROL UNIT

TBWM0101E

ECM Harness Connector Terminal Layout

EBS000QI

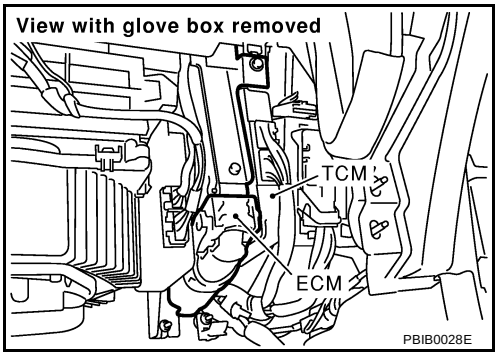


ECM Terminals and Reference Value

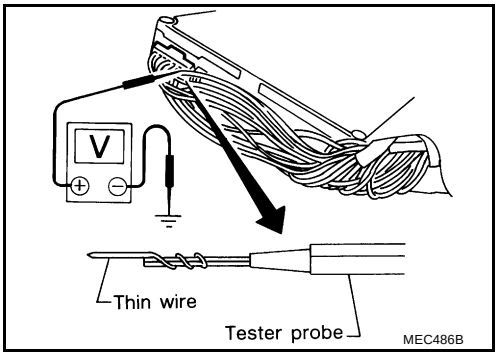
EBS000QJ

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

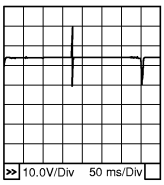
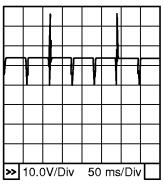


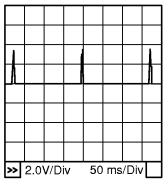
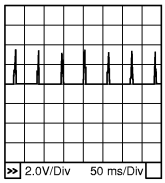
ECM INSPECTION TABLE

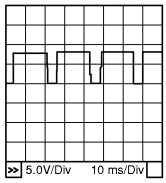
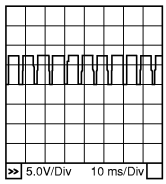
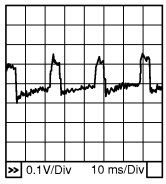
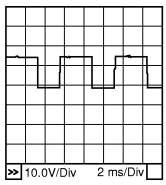
Specification data are reference values and are measured between each terminal and body ground.

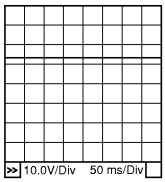
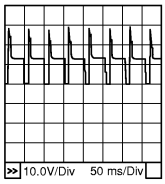
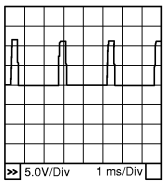
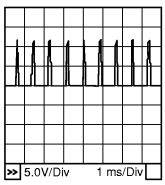
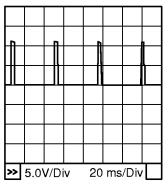
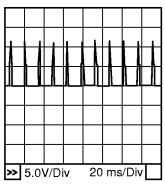
CAUTION:

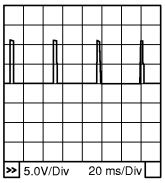
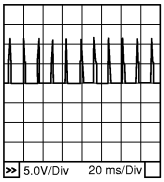
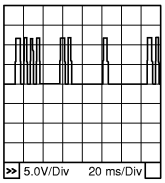
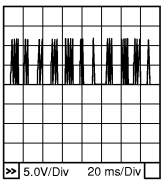
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5 6 7 13 14 15 16 17	B/W L BR P OR/L B/R OR G	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4 Injector No. 5 Injector No. 6 Injector No. 7 Injector No. 8	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0042E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0043E
8	BR	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
9	G/Y	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
10	GY	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
11	G	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
12	W/L	Counter current return	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18 19 20 21 29 30 31 32	Y/R W/G GY W/R GY/R PU/W L/R G/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6 Ignition signal No. 7 Ignition signal No. 8	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0044E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0045E
24	G/W	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are “ON” (Compressor operates).	0 - 1.0V
			[Engine is running] ● A/C switch is “OFF”.	BATTERY VOLTAGE (11 - 14V)
25	B/R	Fuel pump control module	**[When cranking engine]**	0 - 0.5V
			[Engine is running] ● **Warm-up condition** ● Idle speed	8 - 12V
26	OR	Throttle control motor relay	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch “ON”]	0 - 1.0V
27*1	PU	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
27*2	PU	VIAS control solenoid valve	**[Engine is running]** ● Gear position is “P” or “N”	0 - 1.0V
			[Engine is running] ● Gear position is “D”	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
28	L	Cooling fan speed control solenoid valve ground	**[Engine is running]**	Approximately 0V
35	Y/G	MIL	**[Ignition switch “ON”]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

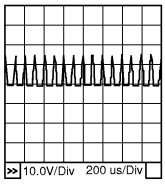
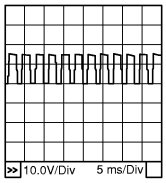
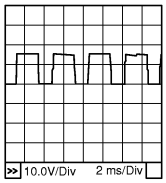
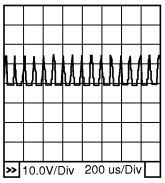
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
38	W/G	Tachometer signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	3 - 6V★  PBIB0046E
			[Engine is running] ● Engine speed is 2,500 rpm.	3 - 6V★  PBIB0047E
39	OR	ASCD communication line	**[Engine is running]** ● Idle speed	3 - 6V★  PBIB0048E
41	GY	Fuel pump relay	**[Ignition switch “ON”]** ● For 5 seconds after turning ignition switch “ON” **[Engine is running]**	0 - 1.0V
			[Ignition switch “ON”] ● More than 5 seconds after turning ignition switch “ON”.	BATTERY VOLTAGE (11 - 14V)
42	W/B	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)
43	G/Y	Vacuum cut valve bypass valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
47	R	Cooling fan speed control solenoid valve	**[Engine is running]** ● Idle speed	6.5 - 8V★  PBIB0049E
53	W/G	Ignition switch	**[Ignition switch “OFF”]**	0V
			[Ignition switch “ON”]	BATTERY VOLTAGE (11 - 14V)

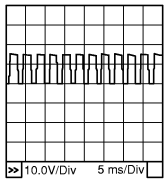
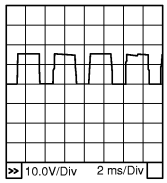
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)★  PBIB0051E
59	SB	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 14V
63	P/L	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 2.0V★  PBIB0052E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 2.0V★  PBIB0053E
73	Y	Intake valve timing control position sensor (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Intake valve timing control position sensor (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E
80	GY/R	PNP switch	**[Ignition switch “ON”]** ● Gear position is “P” or “N”.	Approximately 0V
			[Ignition switch “ON”] ● Except the above gear position	Approximately 5V
84	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0056E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0057E
87	L/W	Accelerator pedal position sensor 1	**[Ignition switch “ON”]** ● Gear position is “D” ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch “ON”] ● Gear position is “D” ● Accelerator pedal fully depressed	Less than 4.75V
88	P	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are “ON”. (Compressor operates.)	1.0 - 4.0V
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B/Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.4V
92	PU/W	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
94	G	Accelerator pedal position sensor 2 power supply	**[Ignition switch “ON”]**	Approximately 2.5V
95	W	Power supply for ECM (Buck-up)	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)
98	W	Throttle position sensor 2	**[Ignition switch “ON”]** ● Gear position is “D” ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch “ON”] ● Gear position is “D” ● Accelerator pedal fully depressed	More than 0.36V
99	L	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
100	BR	Accelerator pedal position sensor 2 ground	**[Ignition switch “ON”]**	Approximately 0V
103	L	Sensors' power supply	**[Ignition switch “ON”]**	Approximately 5V
106	R/W	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
107	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
108	B/W	Throttle position sensor 1	**[Ignition switch “ON”]** ● Gear position is “D” ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch “ON”] ● Gear position is “D” ● Accelerator pedal fully depressed	Less than 4.75V
109	LG	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
110	G	EVAP control system pressure sensor	**[Ignition switch “ON”]**	Approximately 3.4V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	R/Y	Accelerator pedal position sensor signal output	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	0.4 - 0.8V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	4.0 - 5.0V
114	R/L	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
115	L/W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
116	G/R	Fuel pump control module check	**[Engine is running]** ● More than 5seconds after turning ignition switch ON"	Approximately 0V
			[Ignition switch "ON"] ● For 5 seconds after turning ignition switch "ON" **[Engine is running]** ● **Warm-up condition** ● Idle speed	4 - 6V
117	B/R	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	More than 0.18V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	Less than 2.37V
118	R	Power steering oil pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
119	R/L	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
120	L/W	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
121	Y/B	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
122	G/R	Radiator coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with radiator coolant temperature.
123	PU	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
124	B	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
125 126	W W	Knock sensor (bank 1) Knock sensor (bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V
151	L/B	Throttle control motor (Open)	**[Ignition switch “ON”]** ● Accelerator pedal is depressing	0 - 14V★  PBIB0058E
152	P	Intake valve timing control solenoid valve (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0059E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	7 - 12V★  PBIB0060E
153 156 159 165 168	B B B B/W B/W	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
154	L/W	Throttle control motor (Close)	**[Ignition switch “ON”]** ● Accelerator pedal is releasing	0 - 14V★  PBIB0061E

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
155	W/B	Intake valve timing control solenoid valve (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0059E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	7 - 12V★  PBIB0060E
157	L	Throttle control motor relay power supply	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
158	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
163 166	R R	Power supply for ECM	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
164	PU	Data link connector	**[Ignition switch “ON”]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
171	P/B	CAN communication line	**[Ignition switch “ON”]**	Approximately 1.7 - 2.3V Output voltage varies with the communication status.
174	LG/B	CAN communication line	**[Ignition switch “ON”]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For the type I or type II vehicle (Refer to EC-9, "How to Check Vehicle Type" .)
*2: For the type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .)

CONSULT-II Function

EBS000QK

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-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.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
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.

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

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values
7. Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

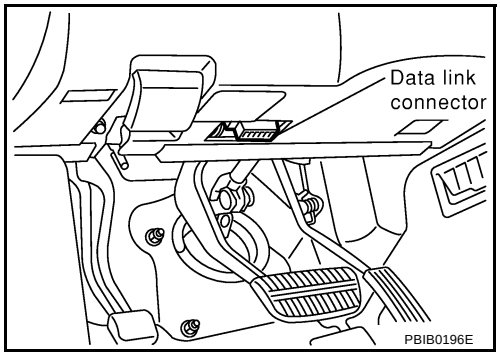
		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×						
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		Absolute pressure sensor		×		×	×			
		Intake air temperature sensor		×		×	×			
		Knock sensor		×						
		Radiator coolant temperature sensor		×		×	×			
		Refrigerant pressure sensor				×	×			
		Ignition switch (start signal)				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		Intake valve timing control position sensor		×		×	×			
		Fuel level sensor		×		×	×			

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)		× (Ignition signal)		×	×	×		
		Throttle control motor relay		×		×	×			
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		FPCM		×		×	×	×		
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan speed control solenoid valve		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve		×		×	×	×		
		Vacuum cut valve bypass valve		×		×	×	×		×
		Intake valve timing control solenoid valve		×		×	×	×		
		VIAS control solenoid valve				×	×	×		
		Calculated load value			×	×	×			

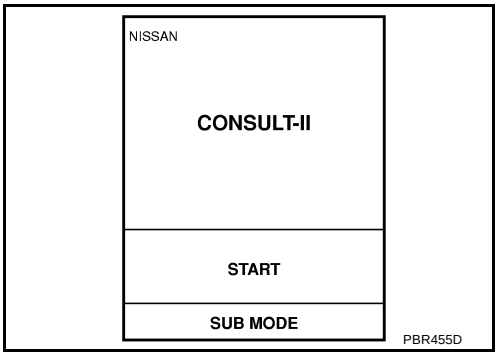
X: Applicable
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-55 .

CONSULT-II INSPECTION PROCEDURE

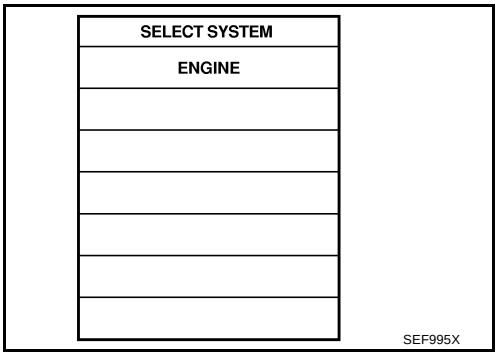
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



4. Touch “START”.

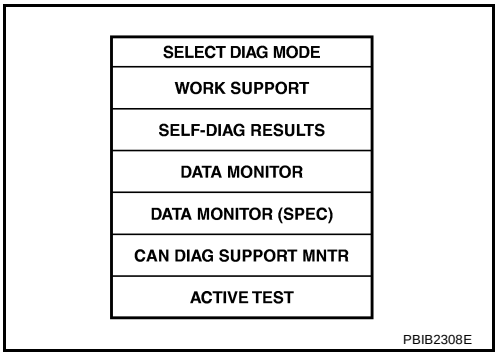


5. Touch “ENGINE”.



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 releasing fuel pressure from fuel line

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW “ON” ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGNITION TIMING ADJ*	● IDLE CONDITION	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light.

*: 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*1	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*2	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2*2	● 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.
S-FUEL TRIM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B2 [%]	● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B2 [%]	● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.

Freeze frame data item*1	Description
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.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding F50 model, "-B1" indicates bank 1 and "-B2" indicates bank 2.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
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.	
HO2S1 (B2) [V]	×	×		
HO2S2 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	×	×		
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.
HO2S1 MNTR (B2) [RICH/LEAN]	×			
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×			

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
FUEL T/TEMP SE [°C] or [°F]	×		● The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	×		● The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	×		● The signal of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	×		● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON ... Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF ... Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]		×	● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]			● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]			● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... intake valve timing control is operating. OFF ... Intake valve timing control is not operating.	
INT/V SOL (B2) [%]				
VIAS S/V [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ● OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is 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.	
FPCM [HI/LOW]			● The control condition of the fuel pump control module (FPCM) (determined by the ECM according to the input signals) is indicated.	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signals) is indicated. ● ON ... Open OFF ... Closed	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ● ON ... Closed OFF ... Open	
THRTL RELAY [ON/OFF]			● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
IDL A/V LEARN [YET/CMPLT/ INCMP]			● 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. INCMP ... Idle air volume learning has not been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MIL is activated.	
TRGT FAN RPM [rpm]			● The target speed of cooling fan operation (determined by the ECM according to the input signals) is displayed.	
RADIATOR TEMP [°C] or [°F]			● The radiator coolant temperature (determined by the signal of the radiator coolant temperature sensor) is displayed.	
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
FAN AMP [mA]			● Indicates cooling fan speed control solenoid valve control value computed by the ECM according to the input signals. ● The cooling fan operating speed becomes higher as the value decrease.	
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				

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding F50 model, "B1" indicates bank 1 and "B2" indicates bank 2.

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).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-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
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
VIAS SOL VALVE	● Ignition switch: ON ● Turn solenoid valve “ON” and “OFF” with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
FPCM	● Engine: Returns to the original trouble condition ● Select “LOW” and “HI” with CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● FPCM
VC/V BYPASS/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● 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
TARGET FAN RPM	● Engine: After warming up, idle the engine ● Change the target speed of cooling fan using CONSULT-II.	Cooling fan operating speed changes according to the target speed.	● Harness and connectors ● Cooling fan speed control solenoid valve ● Cooling fan pump ● Cooling fan drive pump

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-55, "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.

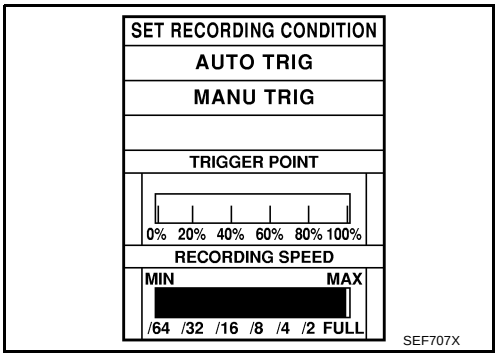
DTC Work Support Mode

Test mode	Test item	Condition	Reference page
EVAP SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-350
	EVAP SML LEAK P1440		EC-498
	PURG VOL CN/V P1444		EC-500
	PURGE FLOW P1447		EC-516
	VC CUT/V BP/V P1491		EC-546
HO2S1	HO2S1 (B1) P0130		EC-197
	HO2S1 (B1) P0131		EC-207
	HO2S1 (B1) P0132		EC-213
	HO2S1 (B1) P0133		EC-220
	HO2S1 (B2) P0150		EC-197
	HO2S1 (B2) P0151		EC-207
	HO2S1 (B2) P0152		EC-213
	HO2S1 (B2) P0153		EC-220
H02S2	HO2S2 (B1) P0137		EC-249
	HO2S2 (B1) P0138		EC-260
	HO2S2 (B1) P0139		EC-271
	HO2S2 (B2) P0157		EC-249
	HO2S2 (B2) P0158		EC-260
	HO2S2 (B2) P0159		EC-271

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”

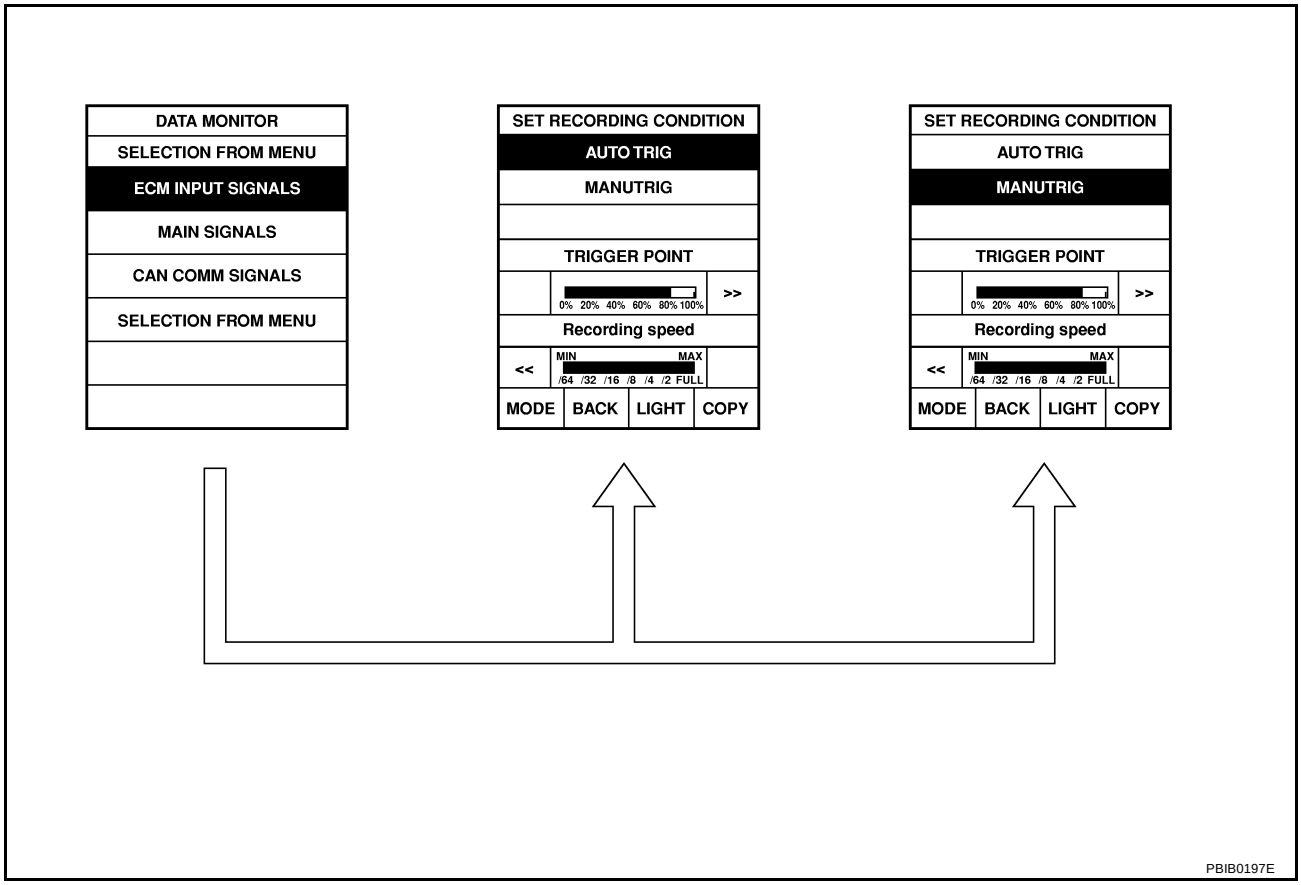
– While trying to detect the DTC/1st trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.

– 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-26, "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.

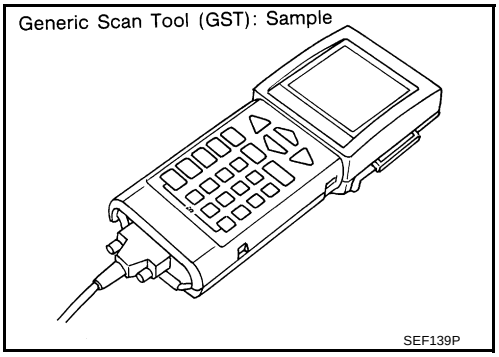


Generic Scan Tool (GST) Function

EBS000QL

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



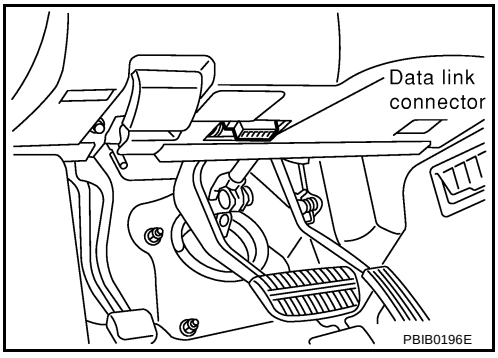
FUNCTION

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-55, "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.

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 can close EVAP system in ignition switch “ON” position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch “OFF” ● Low fuel temperature ● Too much pressure is applied to EVAP system
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.

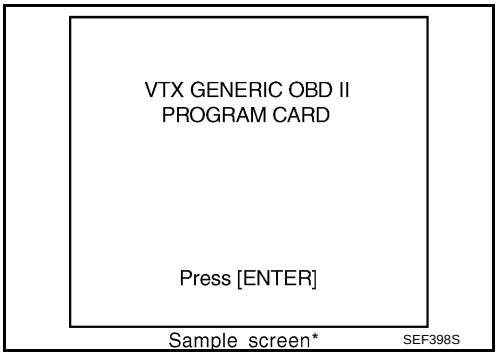
GST INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under LH dash panel near the fuse box cover.



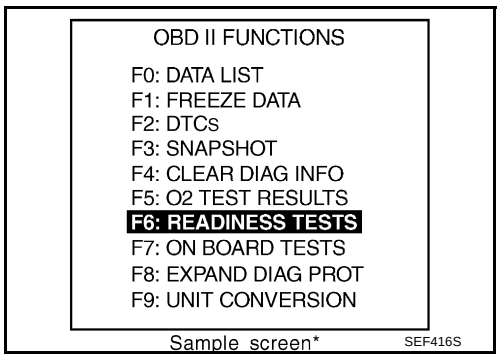
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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

EBS000QM

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 tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	Approx. 1.1 - 1.5V
		2,500 rpm	Approx. 1.7 - 2.4V
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1 ACCEL SEN2	● Ignition switch: ON (engine stopped) ● Shift lever: D	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRTL SEN1 THRTL SEN2	● Ignition switch: ON (Engine stopped) ● Shift lever: D	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
EVAP SYS PRES	● Ignition switch: ON		Approx. 3.4V
ABSOL PRES/SE	● Ignition switch: ON		Approx. 4.4V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON ● Shift lever: D	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	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

MONITOR ITEM	CONDITION		SPECIFICATION
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 INJ PULSE-B2	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.3 - 2.9 msec
		2,000 rpm	2.3 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	15° - 19° BTDC
		2,000 rpm	25° - 45° BTDC
A/F ALPHA-B1 A/F ALPHA-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54% - 155%
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	3.8 - 5.2 g·m/s
		2,500 rpm	16.0 - 21.5 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 50%
VIAS S/V	**Vehicle type I and II*** ● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON
	Vehicle type III* ● Engine speed: Idle	Gear position: “P” or “N”	ON
		Except above	OFF
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL PUMP RLY	● For 5 seconds after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
FPCM	● Engine: Cranking		HI
	● Engine: Idle ● Engine coolant temperature: More than 10°C (50°F)		LOW
VC/V BYPAS S/V	● Ignition switch: ON		OFF
VENT CONT/V	● Ignition switch: ON		OFF
THRTL RELAY	● Ignition switch: ON		ON
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed: Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
	● Engine speed: Above 3,600 rpm		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
TRGT FAN RPM	● Ignition switch: ON (Engine stopped)		0 rpm
	● Engine: Idle		300 - 2,550 rpm
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● Air conditioner switch: OFF		1.0 - 4.0V
FAN AMP	● Cooling fan is operating.		Approx. 0 - 800 mA

*: Refer to EC-9, "How to Check Vehicle Type" .

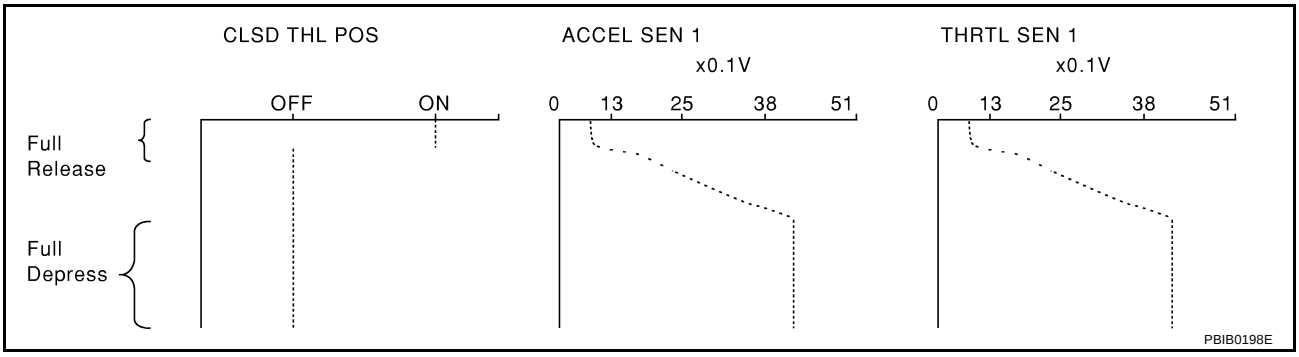
Major Sensor Reference Graph in Data Monitor Mode

EBS000QN

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

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

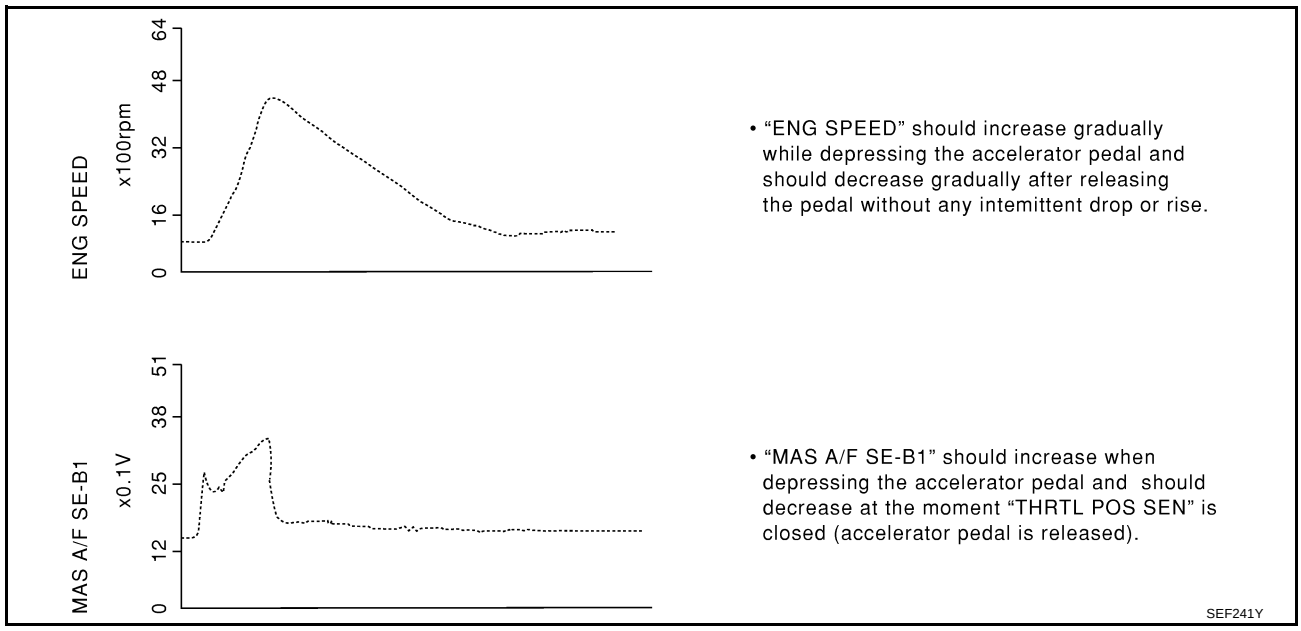
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch “ON” and with selector lever in “D” position.
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



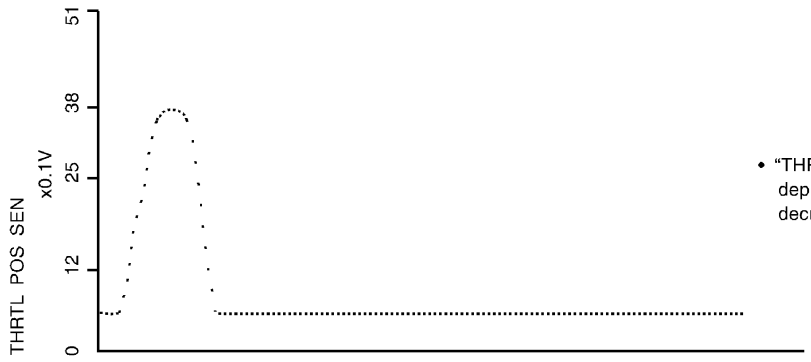
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “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.

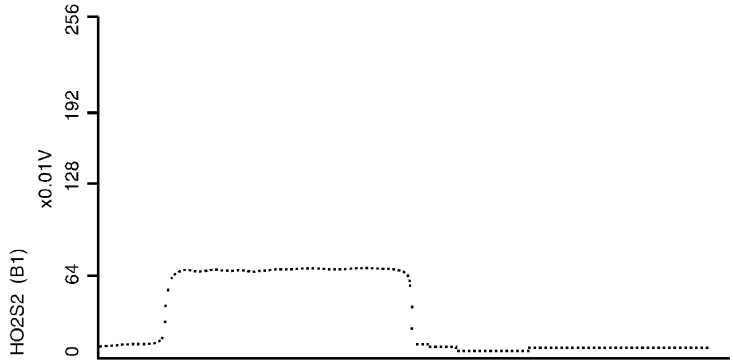
Each value is for reference, the exact value may vary.



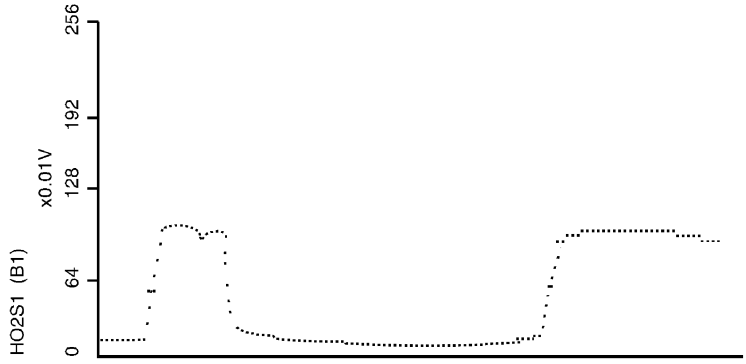
- "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.
- "MAS A/F SE-B1" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).



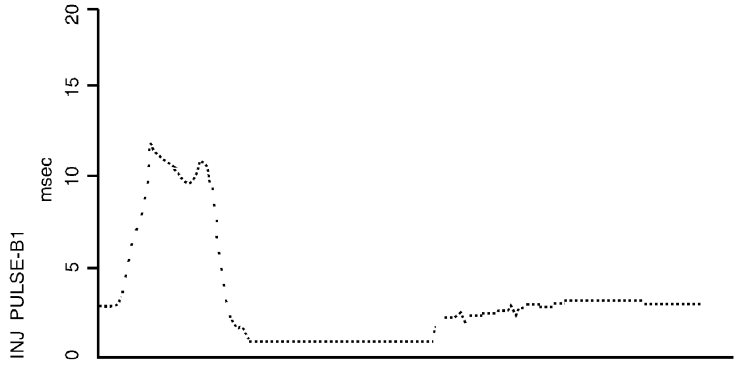
• "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



• "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.

SEF242YA

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

EBS000RP

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

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

Testing Condition

EBS000RQ

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2 , 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

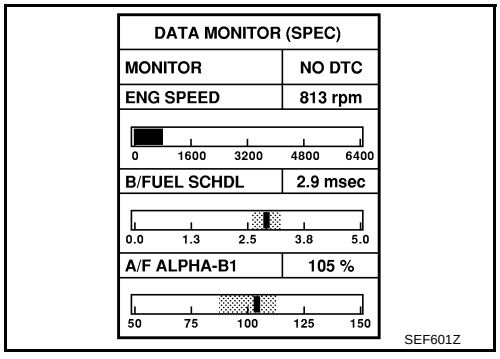
*1: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Steering wheel is straight ahead.

Inspection Procedure

EBS000RR

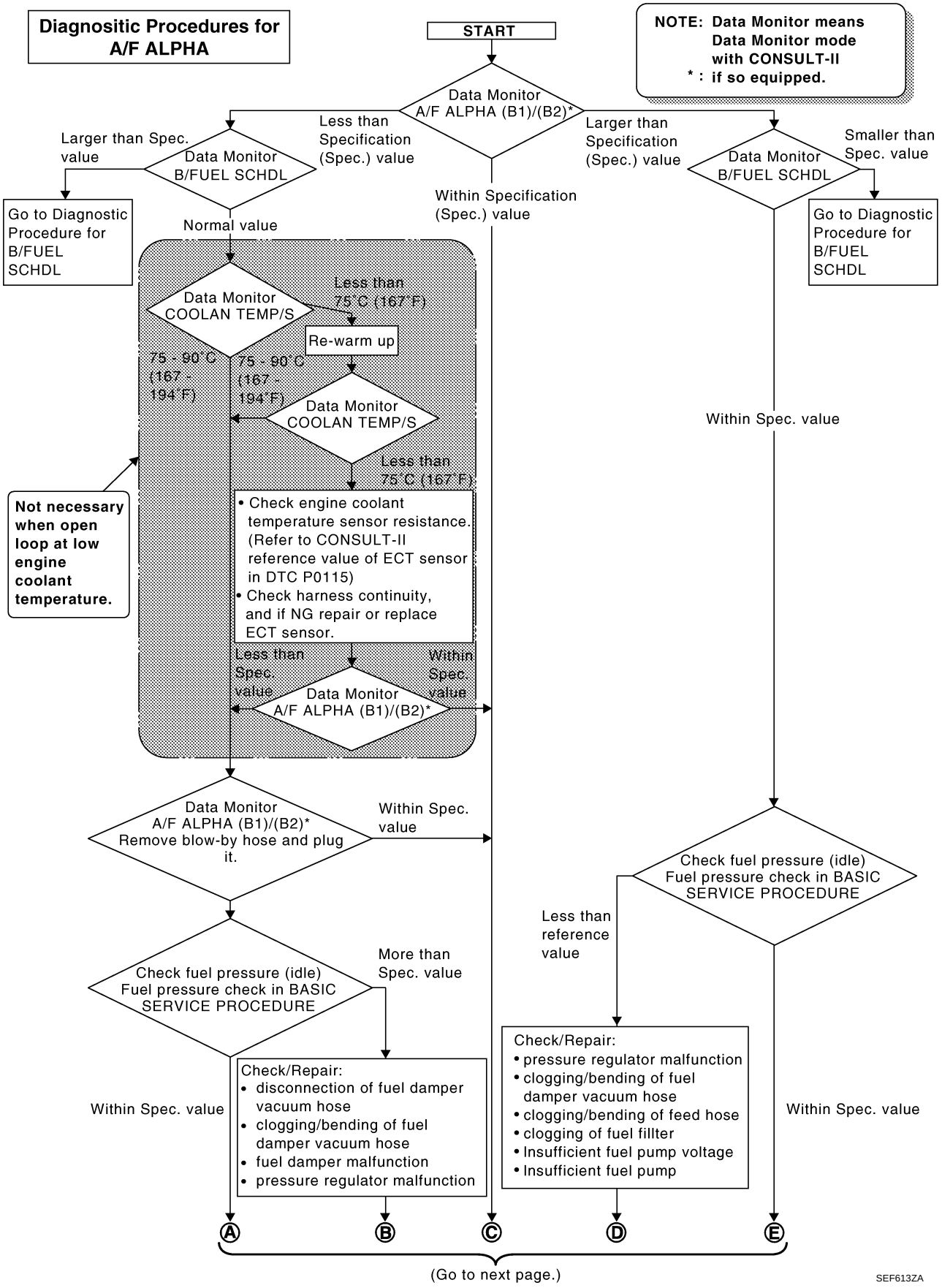
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

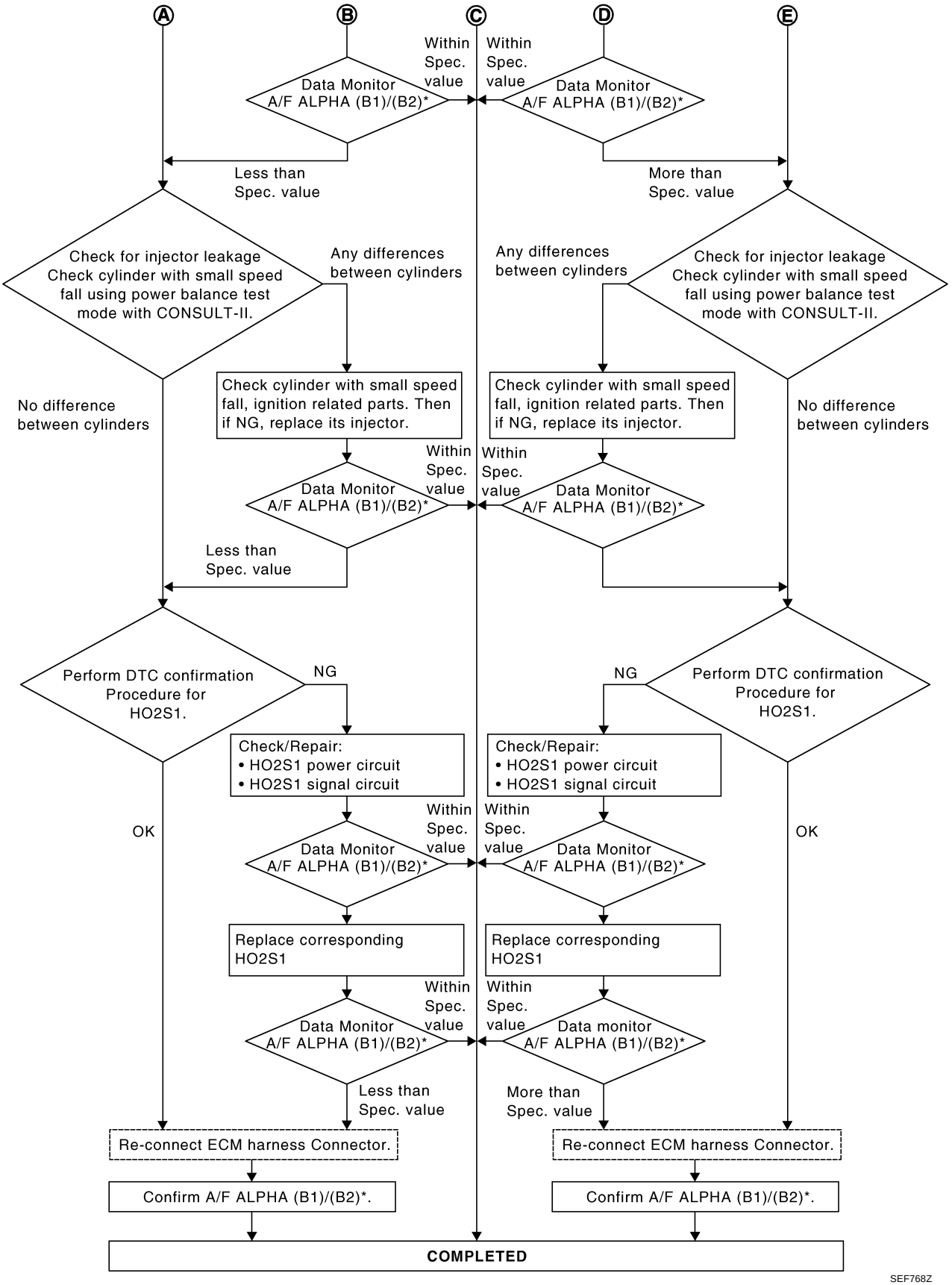
1. Perform EC-82, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-139, "Diagnostic Procedure" .

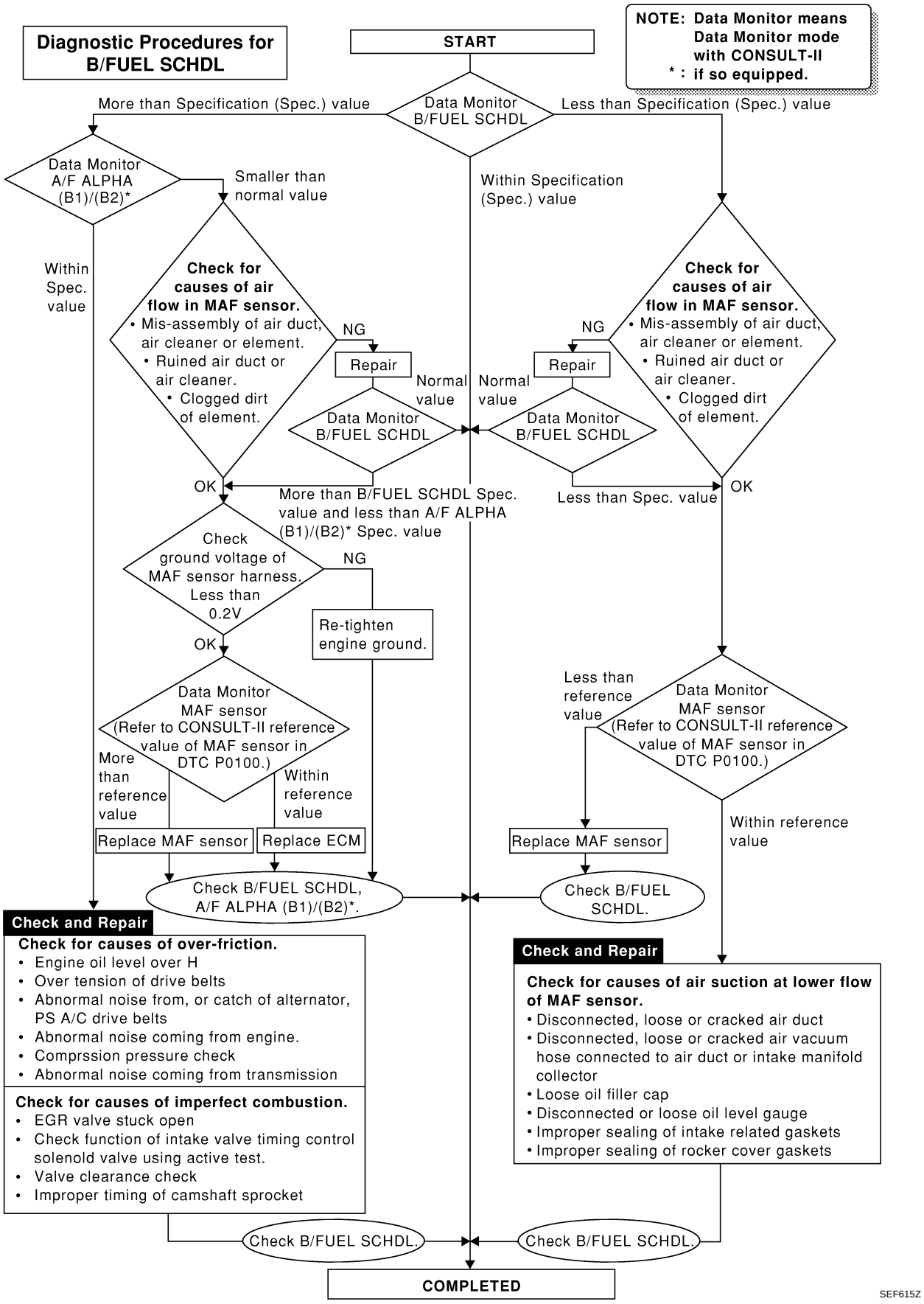


Diagnostic Procedure

EBS000RS




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED
SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Less than Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
Re-tighten engine ground.
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor in DTC P0100.)
More than reference value
Within reference value
Less than reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
Check B/FUEL SCHDL.
COMPLETED
SEF615Z

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS000QO

Intermittent incidents (I/I) may occur. In many cases, the problem 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 problem 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 problem area.

Diagnostic Procedure

EBS000QP

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-63, "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-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , "CIRCUIT INSPECTION", "Ground Inspection".

OK or NG

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

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , "INCIDENT SIMULATION TESTS".

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK CONNECTOR TERMINALS

Refer to GI-23, "How to Check Terminal" , "HOW TO PROBE CONNECTORS", “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

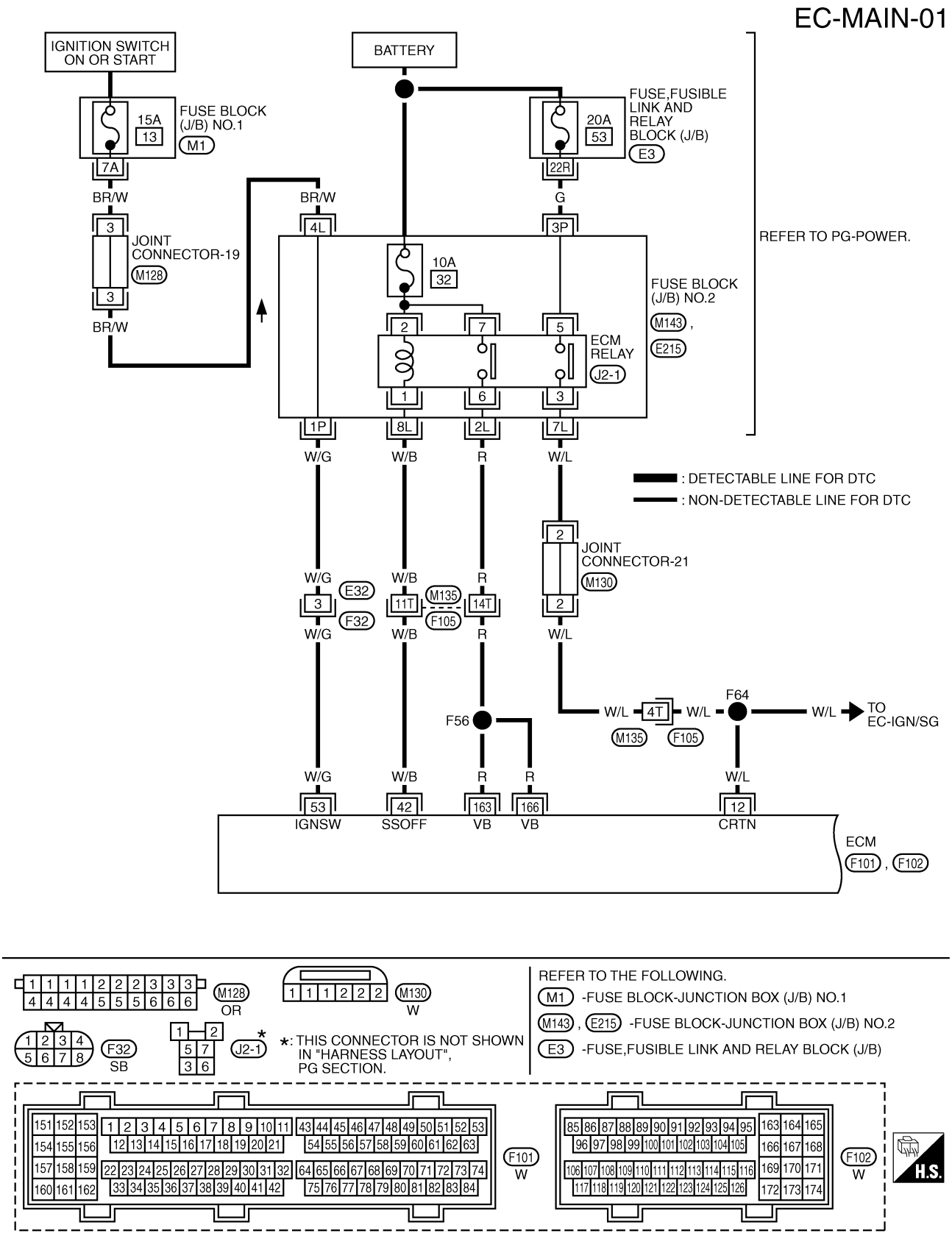
OK >> **INSPECTION END**
NG >> Repair or replace connector.

POWER SUPPLY CIRCUIT FOR ECM

PFP:24110

Wiring Diagram

EBS001FG



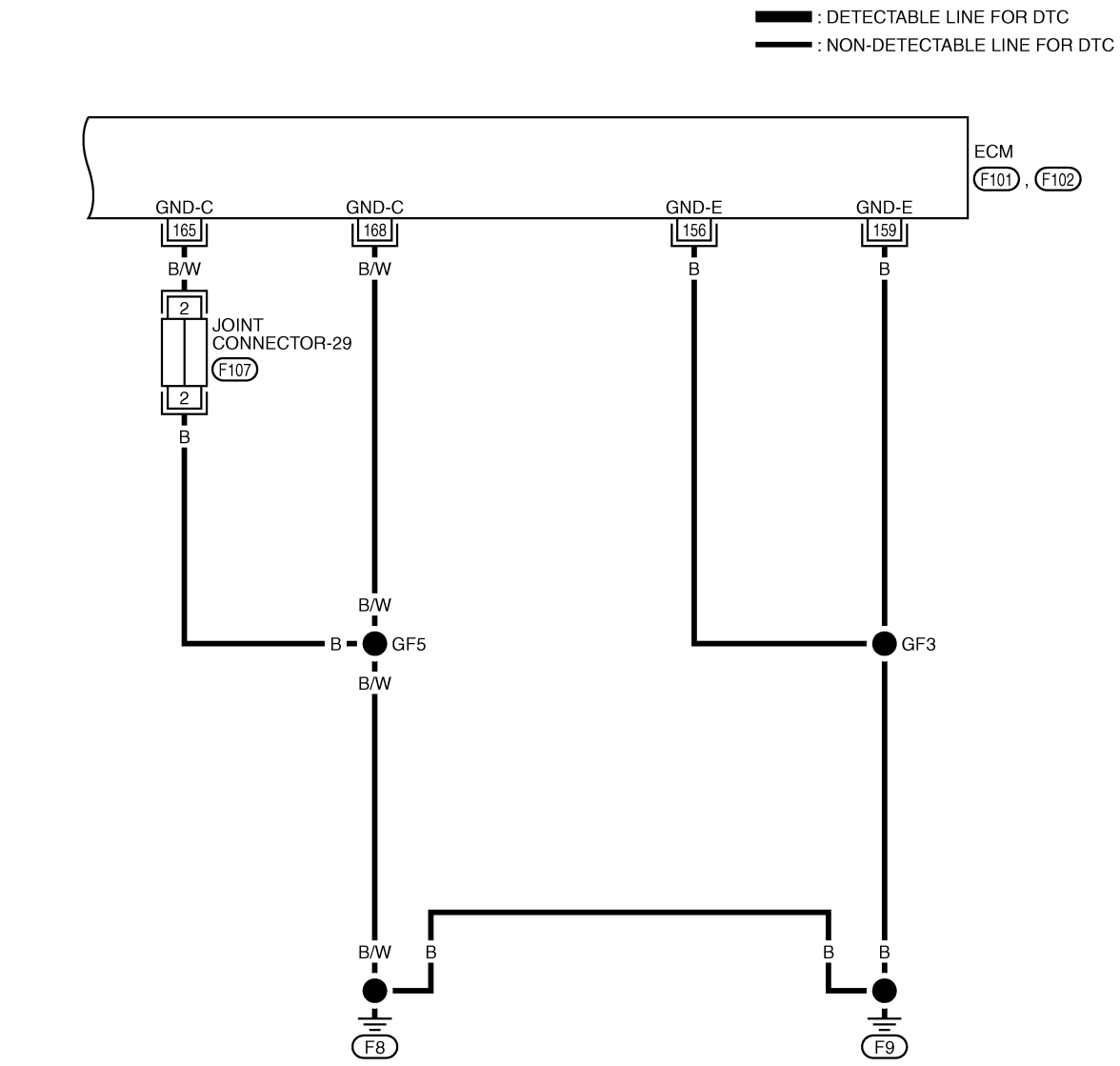
TBWM0003E

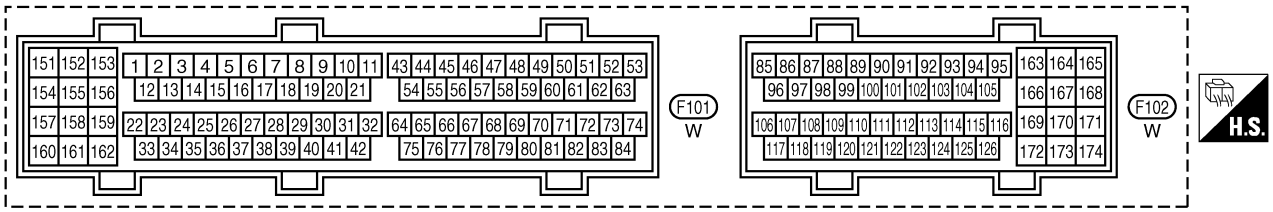
Specification data are reference values and are measured between each terminal and body ground.

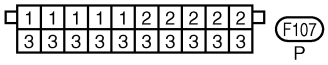
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	W/L	Counter current return	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
42	W/B	ECM relay (Self shutt-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)
53	W/G	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
163 166	R R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

EC-MAIN-02







TBWM0105E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
153 156 159 165 168	B B B B/W B/W	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Diagnostic Procedure

EBS001FH

1. INSPECTION START

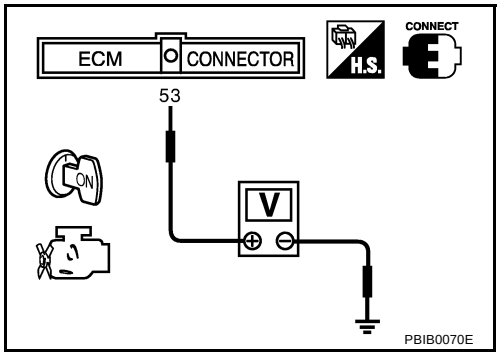
Start engine.
Is engine running?
Yes or No

Yes >> GO TO 10.
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 53 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 E32, F32
- Fuse block (J/B) No. 1 connector M1
- Fuse block (J/B) No. 2 connector M143, E215
- Joint connector-19
- 15A 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 156, 159, 165, 168 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

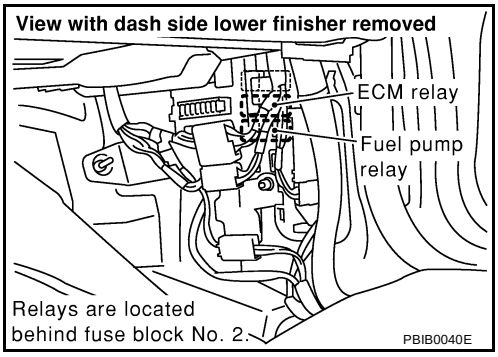
Check the following.

- Joint connector-29
- Harness for open or short between ECM and ground

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

6. CHECK POWER SUPPLY-II

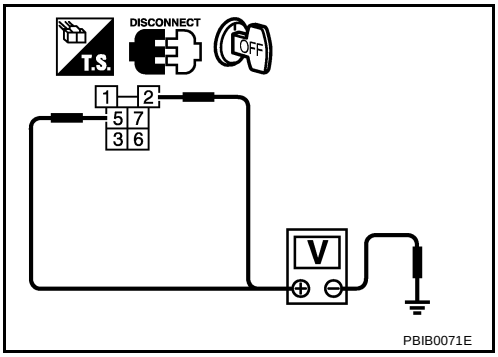
1. Disconnect ECM relay.



2. Check voltage between ECM relay terminals 2, 5 and ground with CONSULT-II or tester.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- 20A fuse
- Fuse block (J/B) No. 2 connector E215
- Fuse, fusible link and relay block (J/B) connector E3
- Harness for open or short between ECM relay and battery

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

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 42 and ECM relay terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> Go to EC-479, "DTC P1320 IGNITION SIGNAL" .
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

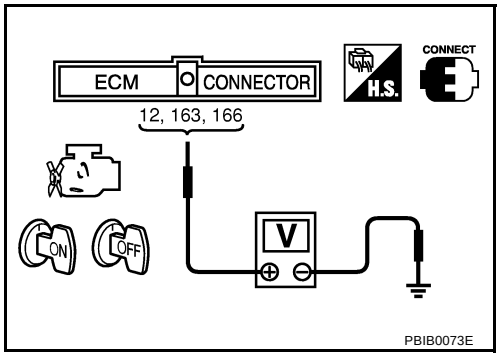
- Harness connectors M135, F105
- Fuse block (J/B) No. 2 connector M143
- Harness for open or short between ECM relay and ECM

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

10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch “ON” and then “OFF”.
2. Check voltage between ECM terminals 12, 163, 166 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.**

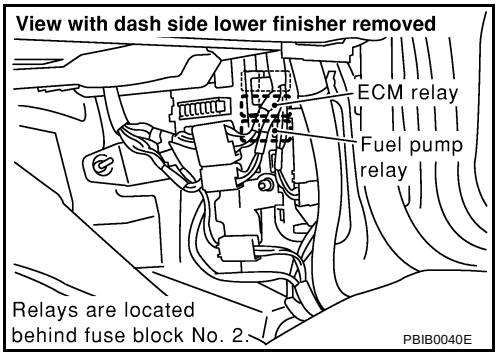


OK or NG

OK >> GO TO 16.
NG (Battery voltage does not exist.)>>GO TO 11.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

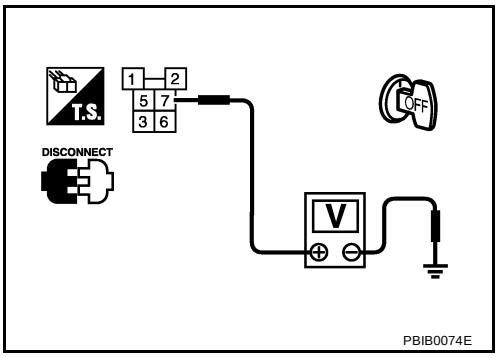
11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminal 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and 10A fuse

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

13. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals and ECM relay terminals as follows. Refer to Wiring Diagram.

ECM terminal	ECM relay terminal
12	3 (or harness connector F105 terminal 4T)
163, 166	6

Continuity should exist.

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

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M135, F105
- Fuse block (J/B) No. 2 connector M143
- Harness for open or short between ECM and ECM relay

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

15. CHECK ECM RELAY

Refer to EC-150, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace ECM relay.

16. 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 156, 159, 165, 168 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-29
- Harness for open or short between ECM and ground

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

18. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

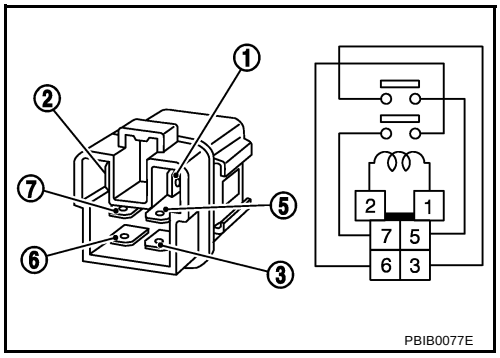
EBS001FI

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

EBS003C7

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

EBS003C8

MALFUNCTION A

Malfunction is detected when ECM can not communicate to other control unit.

MALFUNCTION B

Malfunction is detected When ECM can not communicate for more than the specified time.

Possible Cause

EBS003C9

- Harness or connectors
  (CAN communication line is open or shorted)

DTC Confirmation Procedure

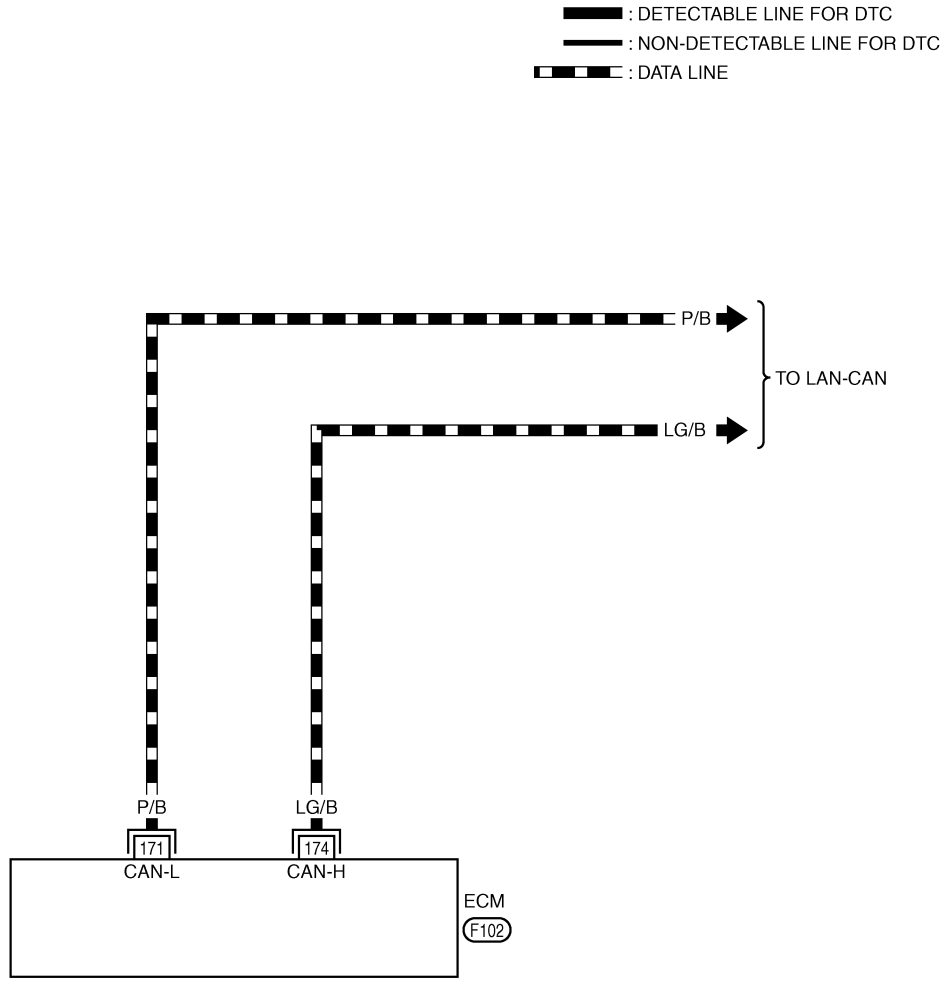
EBS003CA

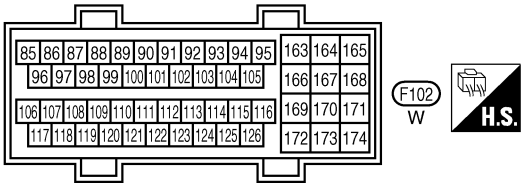
1. Turn ignition switch “ON” and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-153, "Diagnostic Procedure" .

Wiring Diagram

EBS003CB

EC-CAN-01





TBWM0055E

Diagnostic Procedure

EBS003CC

Go to LAN-24, "CAN SYSTEM (FOR VDC MODELS)" or LAN-42, "CAN SYSTEM (FOR ICC MODELS)" .

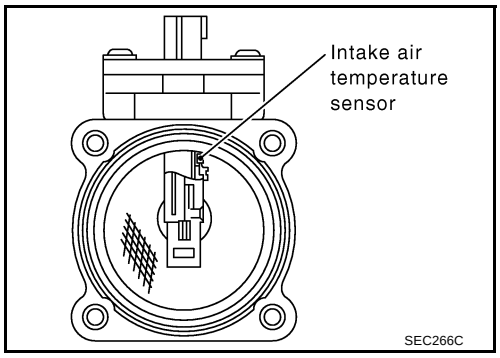
DTC P0100 MASS AIR FLOW (MAF) SENSOR

PFP:22680

Component Description

EBS002FF

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

EBS002FG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.1 - 1.5V
		2,500 rpm	1.7 - 2.4V
CAL/LD VALUE	ditto	Idle	15.0 - 35.0%
		2,500 rpm	10.0 - 35.0%
MASS AIRFLOW	ditto	Idle	3.8 - 5.2 g·m/s
		2,500 rpm	16.0 - 21.5 g·m/s

On Board Diagnosis Logic

EBS002FH

Malfunction is detected when
(Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,
(Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,
(Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,
(Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition,
(Malfunction E) a voltage from the sensor is constantly approx. 1.0V when engine is running.

FAIL-SAFE MODE

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

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

Possible Cause

EBS002FI

MALFUNCTION A OR C

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Mass air flow sensor

MALFUNCTION B, D OR E

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

DTC Confirmation Procedure

EBS002FJ

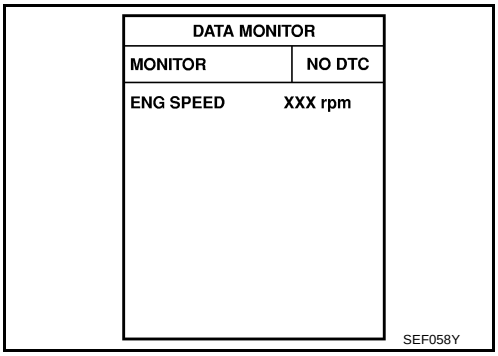
Perform “PROCEDURE FOR MALFUNCTION A” first.
If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND E”.
If there is no problem on “PROCEDURE FOR MALFUNCTION B AND E”, perform “PROCEDURE FOR MALFUNCTION C”.
If there is no problem on ”PROCEDURE FOR MALFUNCTION C”, perform “PROCEDURE FOR MALFUNCTION D”.

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. Wait at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-159, "Diagnostic Procedure" .



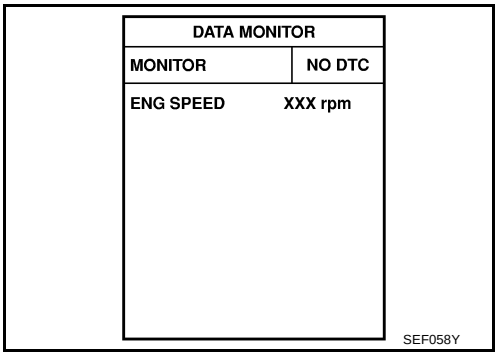
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND E

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait 5 seconds at most.
4. If 1st trip DTC is detected, go to EC-159, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

NOTE:
If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

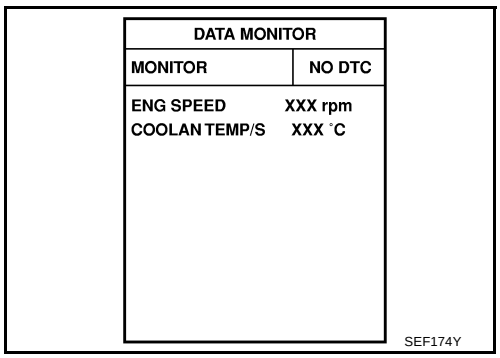
PROCEDURE FOR MALFUNCTION C

NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch “ON”) instead of running engine at idle speed.

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.

3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-159, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

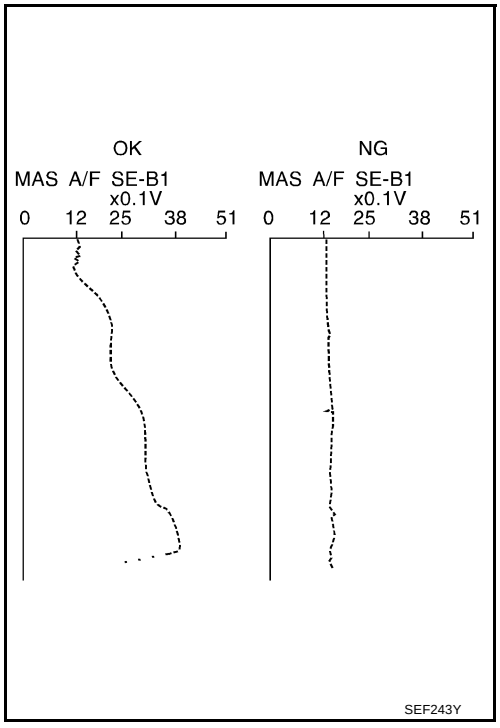
PROCEDURE FOR MALFUNCTION D

CAUTION:

Always drive vehicle at a safe speed.

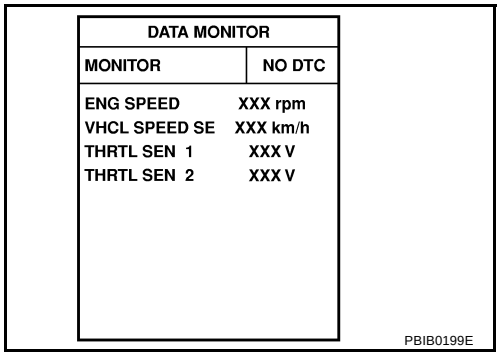
With CONSULT-II

1. Turn ignition switch “ON”.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-159, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-159, "Diagnostic Procedure" .
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1	More than 3V
THRTL SEN 2	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



8. If 1st trip DTC is detected, go to EC-159, "Diagnostic Procedure" .

Overall Function Check

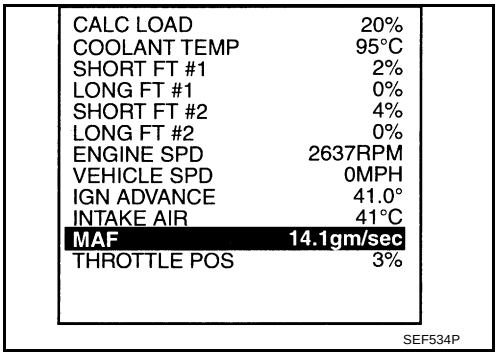
EBS002FK

PROCEDURE FOR MALFUNCTION D

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

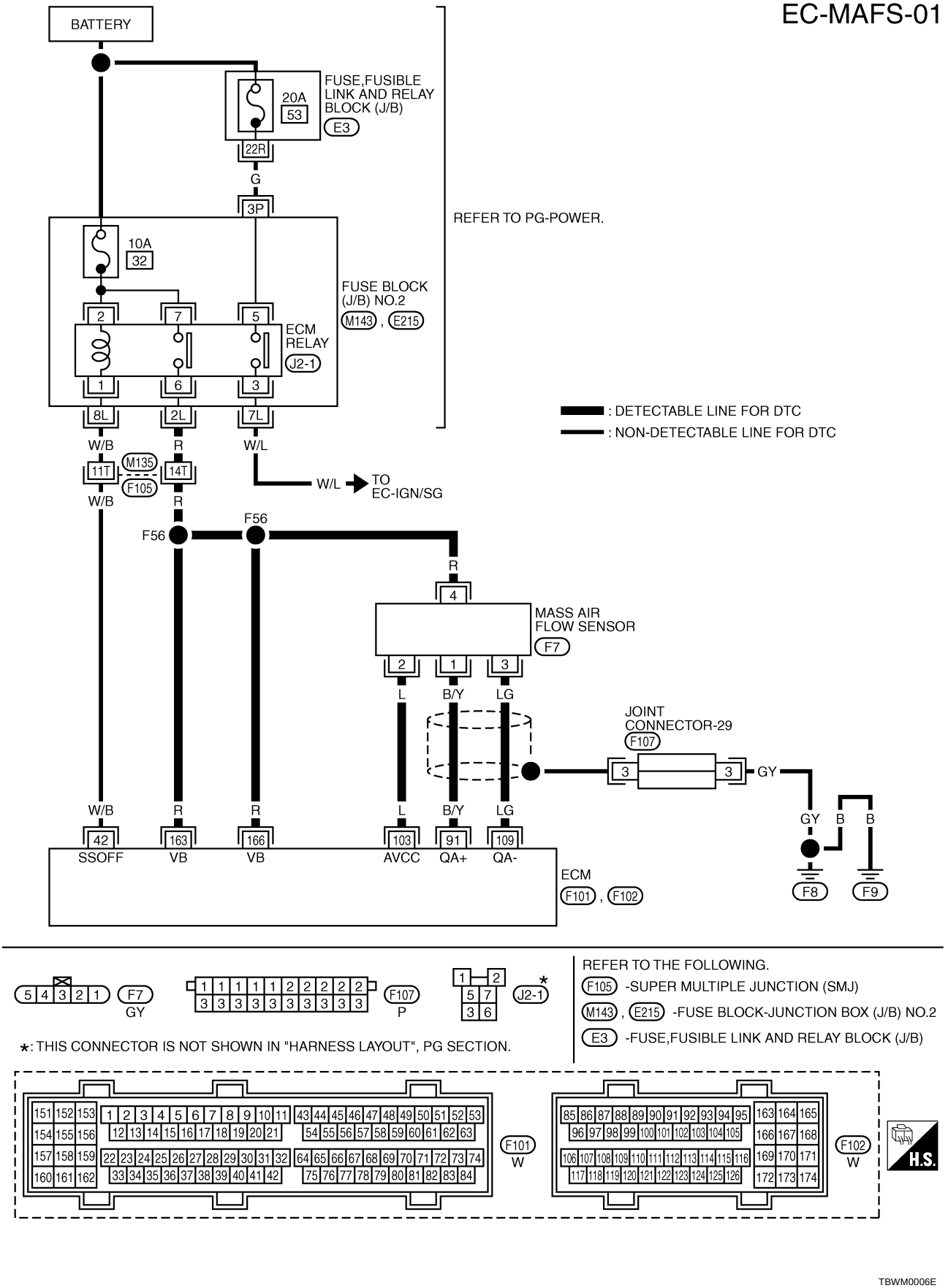
1. Start engine and warm it up to normal operating temperature.
2. Select “MODE 1” with GST.
3. Check the mass air flow sensor signal with “MODE 1”.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to “Diagnostic Procedure”, EC-159 .



Wiring Diagram

EBS002FL

EC-MAFS-01



★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M143 , E215 -FUSE BLOCK-JUNCTION BOX (J/B) NO.2

E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0006E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	W/B	ECM relay (Self shutt-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)
91	B/Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.4V
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
109	LG	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
163 166	R R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS002FM

1. INSPECTION START

Which malfunction (A, B, C, D or E) is duplicated?

Malfunction	Type
A and/or C	I
B, D and/or E	II

Type I or Type II

Type I >> GO TO 3.
Type II >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connection.

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

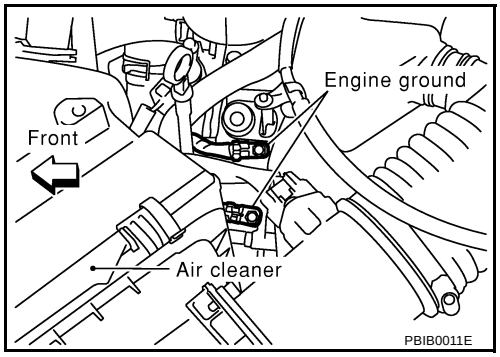
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

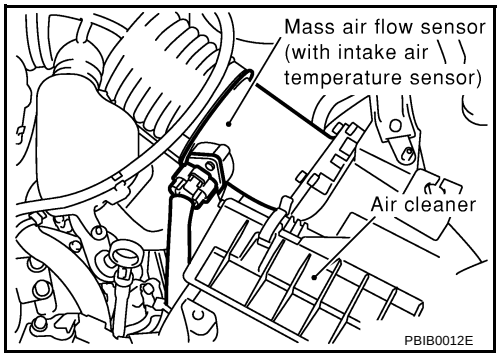
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



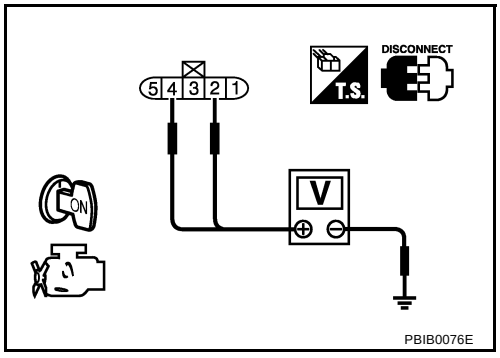
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector M135, F105
- Fuse block (J/B) No. 2 connector M143
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 109.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 91.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-162, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK MAF SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect joint connector-29.
3. Check the following.

- Joint connector-29
  (Refer to PG-26, "Harness Layout" .)
- Continuity between joint connector-29 terminal 3 and ground
  Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-29.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

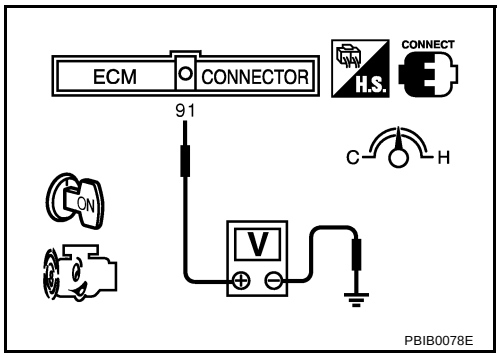
>> **INSPECTION END**

Component Inspection

EBS002FN

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 91 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.4
Idle to about 4,000 rpm*	1.1 - 1.5 to Approx. 4.0

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

4. If the voltage is out of specification, proceed the following.
   - Turn ignition switch “OFF”.
   - Disconnect mass air flow sensor harness connector and reconnect it again.
   - Perform steps 2 and 3 again.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

EBS002FO

MASS AIR FLOW SENSOR

Refer to EM-15, "AIR CLEANER AND AIR DUCT" .

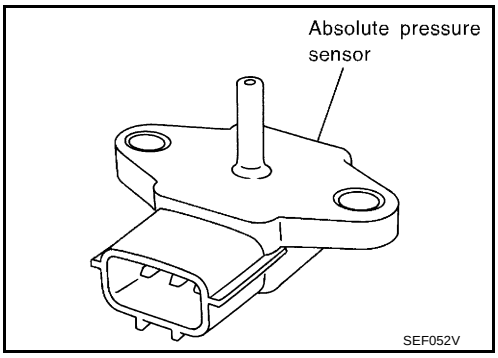
DTC P0105 ABSOLUTE PRESSURE SENSOR

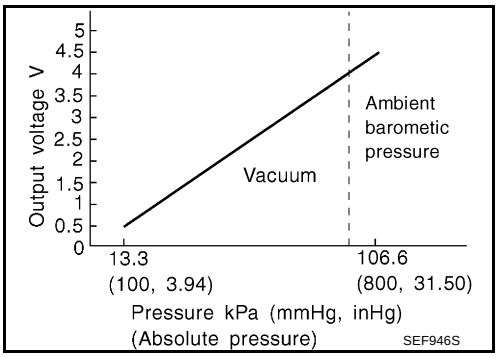
PFP:22365

Component Description

EBS000R0

The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.





On Board Diagnosis Logic

EBS000R1

Malfunction is detected when an excessively low or high voltage from the sensor is sent to ECM.

Possible Cause

EBS000R2

- Harness or connectors
  (Absolute pressure sensor circuit is open or shorted.)
- Absolute pressure sensor

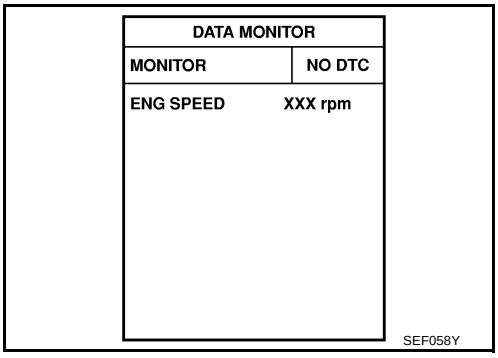
DTC Confirmation Procedure

EBS000R3

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 10 seconds.
4. If 1st trip DTC is detected, go to EC-165, "Diagnostic Procedure"
   .



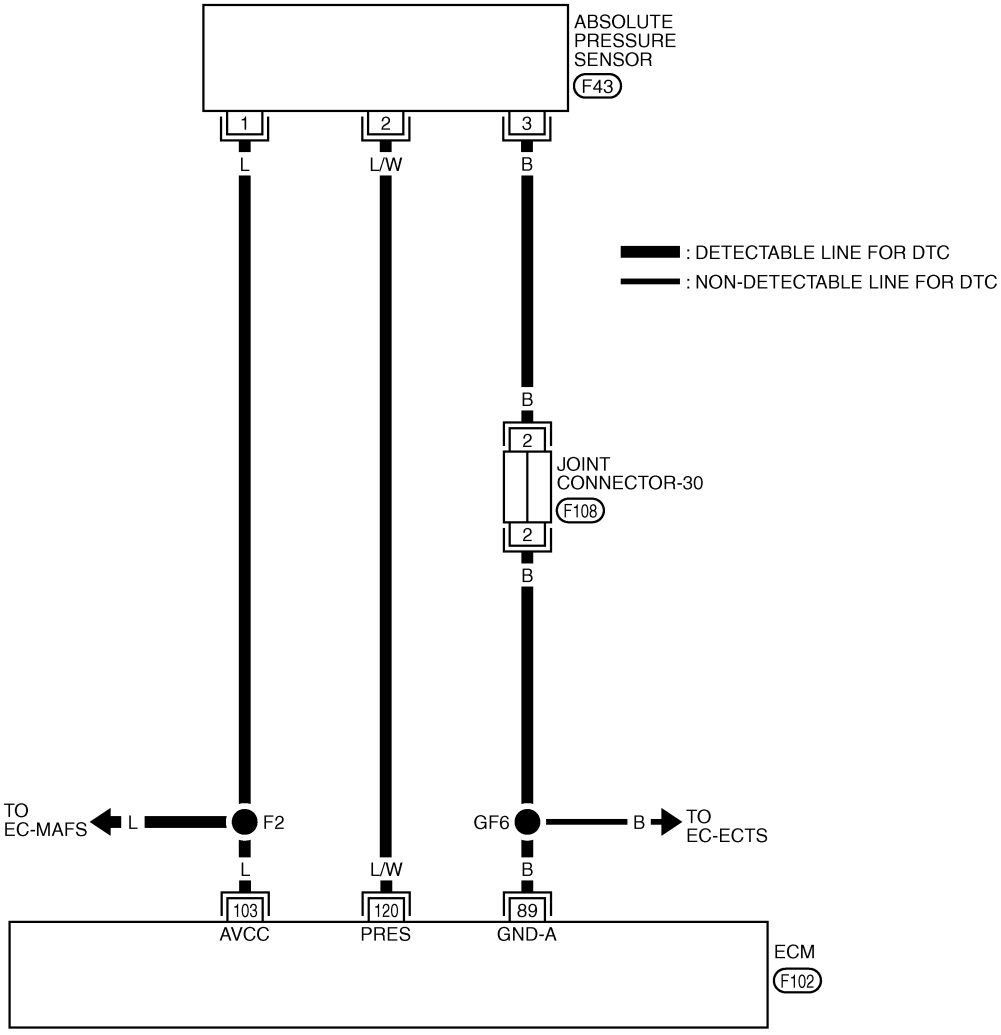
WITH GST

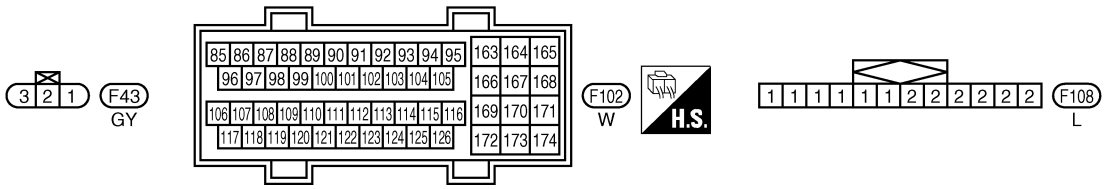
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS000R4

EC-AP/SEN-01





TBWM0007E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	B	Sensor's ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Engine ground
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
120	L/W	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V

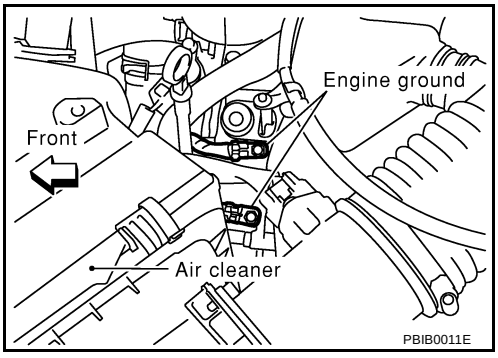
Diagnostic Procedure

EBS000R5

1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



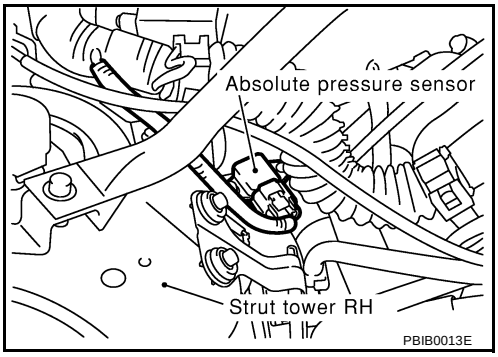
2. CHECK ABSOLUTE PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect absolute pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

OK or NG

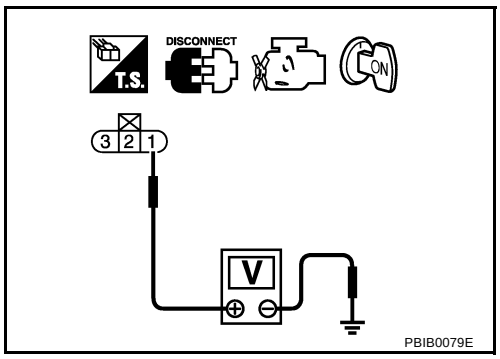
OK >> GO TO 3.
NG >> Repair or replace harness connector.



3. CHECK ABSOLUTE PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between absolute pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair harness or connectors.

4. CHECK ABSOLUTE PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between absolute pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-30
- Harness for open or short between ECM and absolute pressure sensor

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

6. CHECK ABSOLUTE PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 120 and absolute pressure sensor terminal 2.

Continuity should exist.

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

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ABSOLUTE PRESSURE SENSOR

Refer to EC-167, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace absolute pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

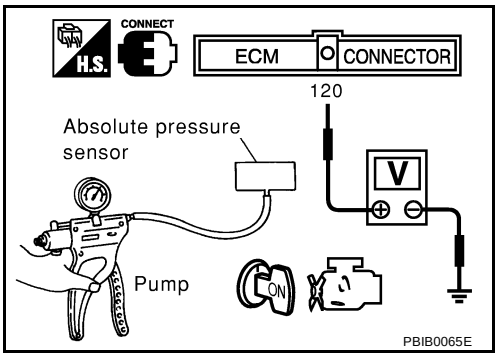
Component Inspection

EBS000R6

ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch “ON” and check output voltage between ECM terminal 120 and engine ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage
Not applied	3.2 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4 V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

5. If NG, replace absolute pressure sensor.

Removal and Installation

EBS000R7

ABSOLUTE PRESSURE SENSOR

Refer to EM-17, "INTAKE MANIFOLD"

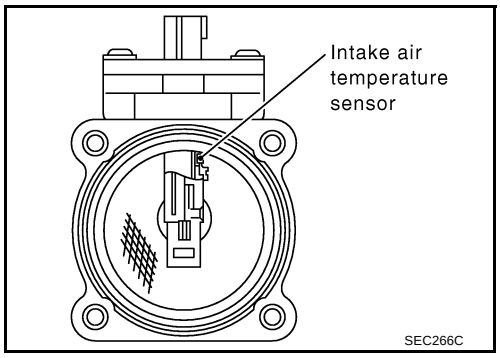
DTC P0110 INTAKE AIR TEMPERATURE (IAT) SENSOR

PFP:22630

Component Description

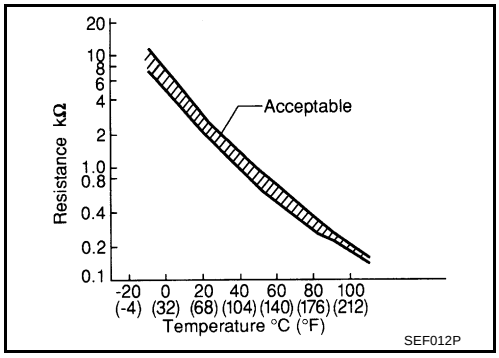
EBS002GE

The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
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 99 (Intake air temperature sensor) and body 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

EBS002GF

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

Possible Cause

EBS002GG

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

EBS002GH

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

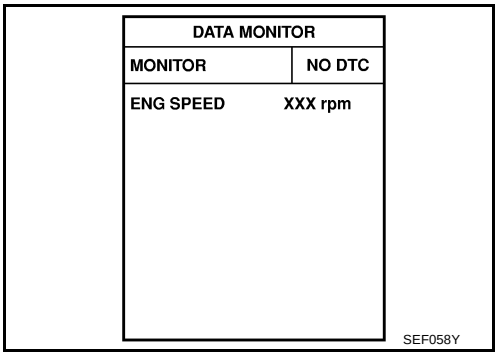
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch "ON".

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-171, "Diagnostic Procedure"
.



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

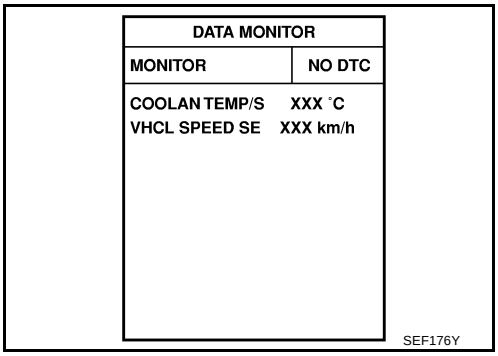
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F).

– Turn ignition switch “ON”.
– Select “DATA MONITOR” mode with CONSULT-II.
– Check the engine coolant temperature.
– If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch “OFF” and cool down engine.
– Perform the following steps before engine coolant temperature is above 90°C (194°F).

2. Turn ignition switch “ON”.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-171, "Diagnostic Procedure"
.



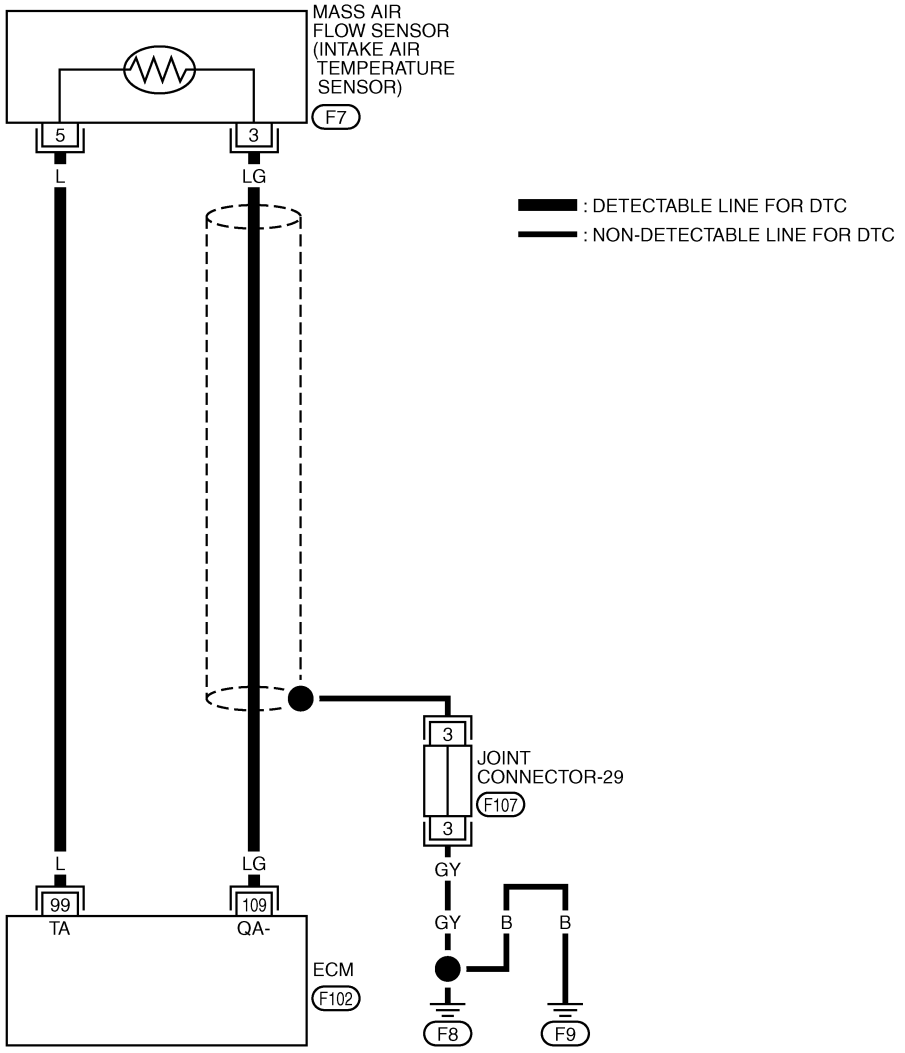
With GST

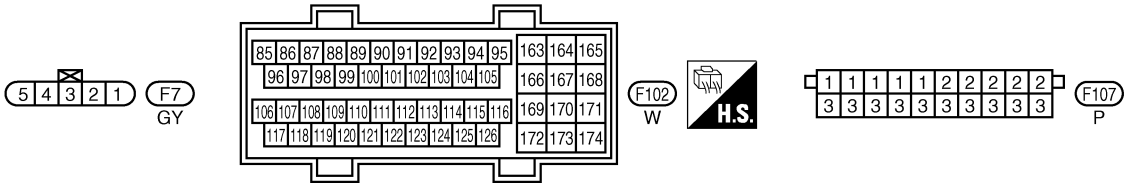
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS002GI

EC-IATS-01





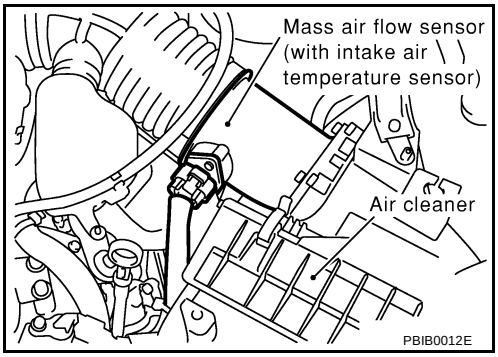
TBWM0008E

Diagnostic Procedure

EBS002GJ

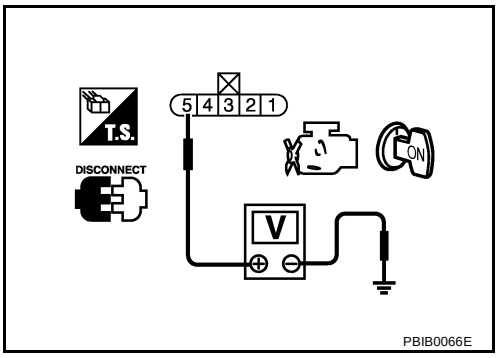
1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



4. Check voltage between mass air flow sensor terminal 5 and ground.

Voltage: Approximately 5 V



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 mass air flow sensor terminal 3 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 3.
NG >> Repair harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-172, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

4. CHECK INTAKE AIR TEMPERATURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect joint connector-29.
3. Check the following.

- Continuity between joint connector-29 terminal 3 and ground
  Refer to Wiring Diagram.
- Joint connector-29
  (Refer to PG-26, "Harness Layout" .)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-29.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

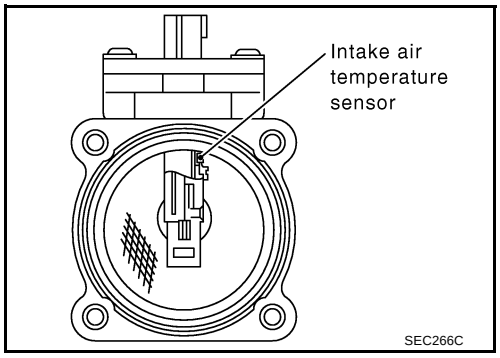
Component Inspection

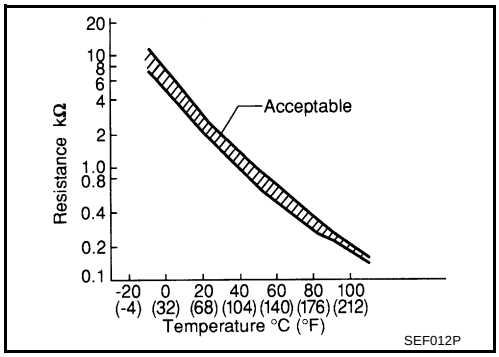
EBS002GK

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature 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 mass air flow sensor (with intake air temperature sensor).

Removal and Installation

EBS002GL

INTAKE AIR TEMPERATURE SENSOR

Refer to EM-15, "AIR CLEANER AND AIR DUCT"

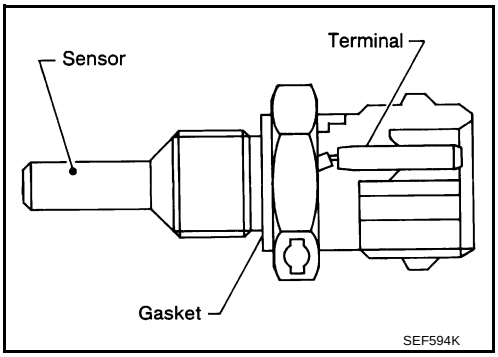
DTC P0115 ENGINE COOLANT TEMPERATURE (ECT) SENSOR (CIRCUIT)

PFP:22630

Component Description

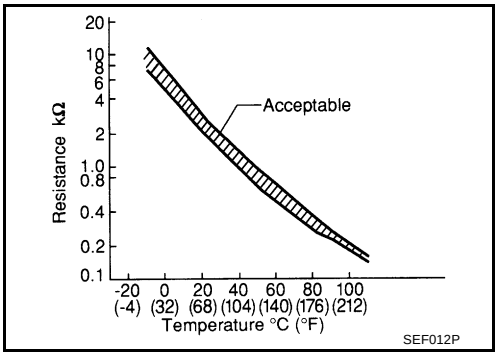
EBS002FP

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 121 (Engine coolant temperature sensor) and body 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

EBS002FQ

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MIL 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)

Possible Cause

EBS002FR

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

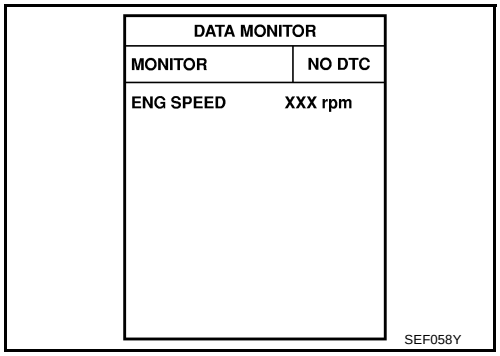
DTC Confirmation Procedure

EBS002FS

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 1st trip DTC is detected, go to EC-176, "Diagnostic Procedure"
   .



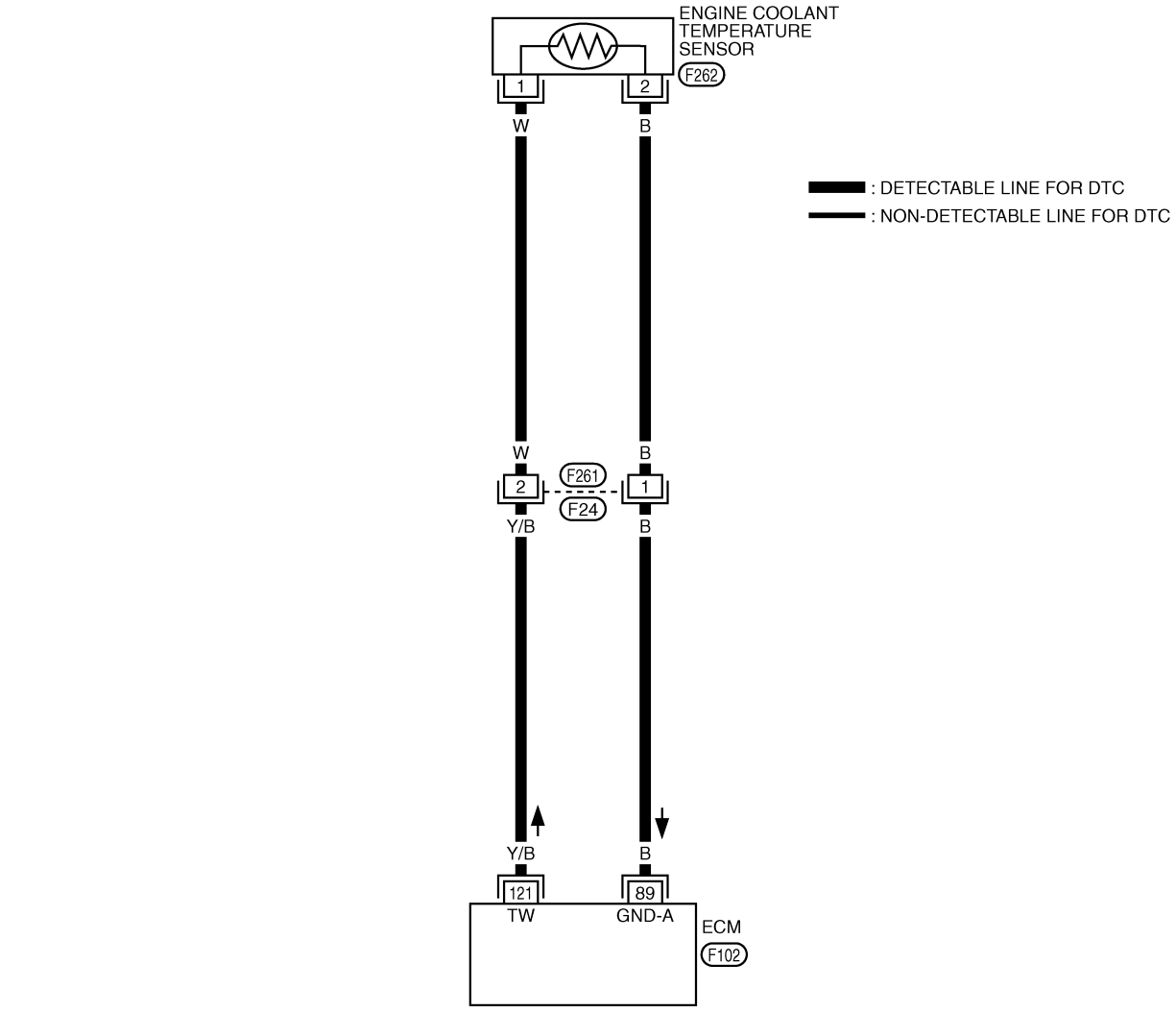
WITH GST

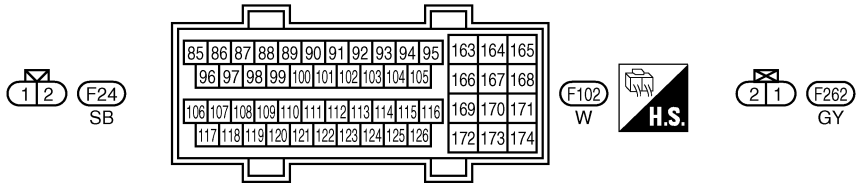
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002FT

EC-ECTS-01





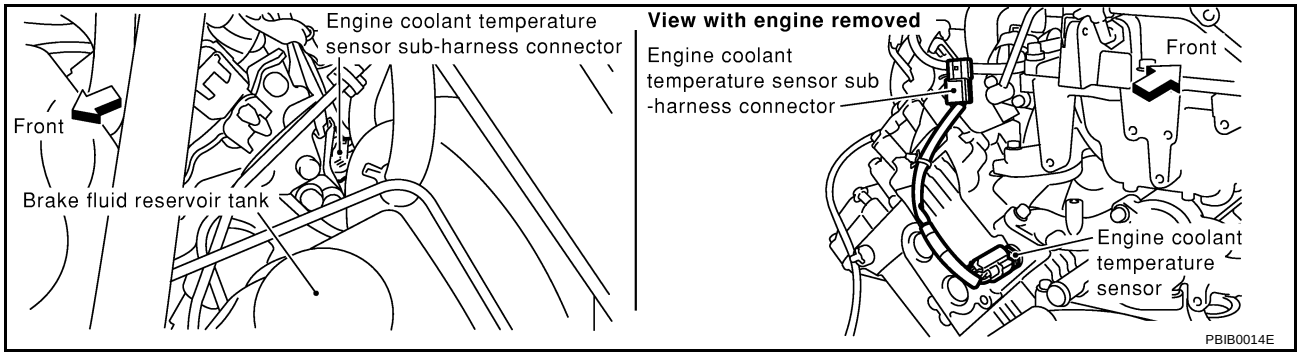
TBWM0009E

Diagnostic Procedure

EBS002FU

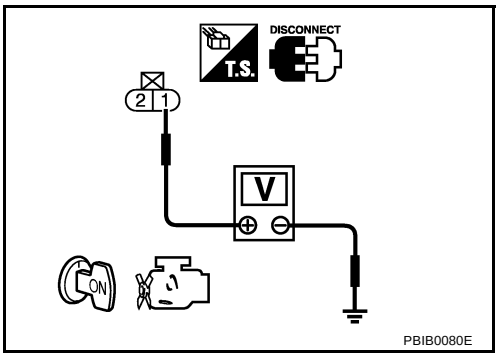
1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F261, F24
- Harness for open or short between ECM and engine coolant temperature sensor

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

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND CIRCUIT

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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F261, F24
- Harness for open or short between ECM and engine coolant temperature sensor

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

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-177, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace engine coolant temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

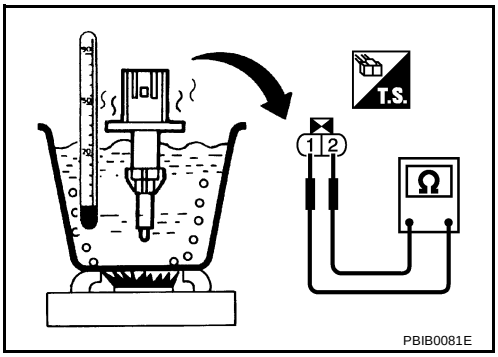
>> **INSPECTION END**

Component Inspection

EBS002FV

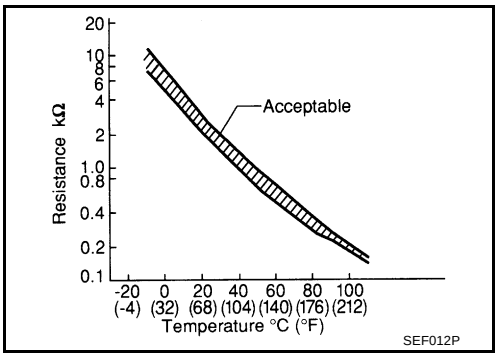
ENGINE COOLANT TEMPERATURE SENSOR

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 121 (Engine coolant temperature sensor) and body ground.

2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS002FW

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-55, "CYLINDER HEAD" .

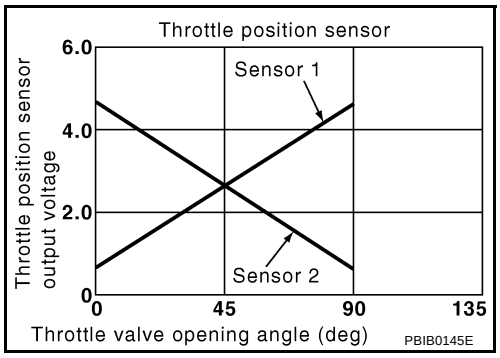
DTC P0120 THROTTLE POSITION (TP) SENSOR

PFP:16119

Component Description

EBS002FX

Electric Throttle Control Actuator consists of throttle control motor, acceleration pedal position sensor, 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

EBS002WB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2	● Ignition switch: ON (Engine stopped) ● Shift lever: D	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

On Board Diagnosis Logic

EBS002WC

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the throttle position sensor 1 is sent to ECM,
(Malfunction B) an excessively low or high voltage from the throttle position sensor 2 is sent to ECM,
(Malfunction C) a difference between signals from sensor 1 and sensor 2 is out of the specified range,
(Malfunction D) ECM detects a voltage of power source for sensor is excessively low or high,
(Malfunction E) closed throttle position learning value is excessively low,
(Malfunction F) closed throttle position learning is not performed successfully, repeatedly,
(Malfunction G) throttle valve opening angle, computed by the ECM from the input signals of sensor 1 and sensor 2, is out of the normal range.

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction A, B, C,D or G is detected.

<table>
<tr><th>Detected items</th><th colspan="2">Engine operation condition in fail-safe mode</th></tr>
<tr><td>Malfunction A
Malfunction B
Malfunction C*</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.
When this malfunction is detected, ECM stores the DTC and light up the MIL even in a 1st trip for type II or type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .).</td></tr>
<tr><td>Malfunction D</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
When the accelerator pedal depressed value reaches a throttle opening of 30 degrees or more, the throttle valve opens to a maximum of 20 degrees by the accelerator wire.
When this malfunction is detected, ECM stores the DTC and light up the MIL even in a 1st trip for type II or type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .).</td></tr>
<tr><td rowspan="4">Malfunction G</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.The MIL lights up.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
</table>

*: The ECM enters in the fail-safe mode when the normal signal is entered to the ECM after the malfunction C was detected.

Possible Cause

EBS002WD

MALFUNCTION A, B, C AND G

- Harness or connectors
  (The throttle position sensor 1 or 2 circuit is open or shorted.)
- Electric throttle control actuator

MALFUNCTION D

- Harness or connectors
  (The throttle position sensor 1, 2, accelerator pedal position sensor 1, 2, mass air flow sensor, power steering pressure sensor, refrigerant pressure sensor, absolute pressure sensor and EVAP system pressure sensor circuit is shorted.)
- ECM
  (ECM pin terminal is bend or brake.)

MALFUNCTION E AND F

- Electric throttle control actuator

DTC Confirmation Procedure

EBS002WE

NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A, B, C, D AND G” first. If the (1st trip) DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION E”. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION F”.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

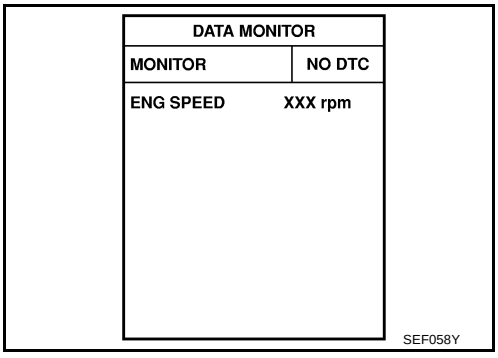
TESTING CONDITION:

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

PROCEDURE FOR MALFUNCTION A, B, C, D AND G

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 (1st trip) DTC is detected, go to EC-182, "MALFUNCTION A, B, C, D AND G" in “Diagnostic Procedure”.



With GST

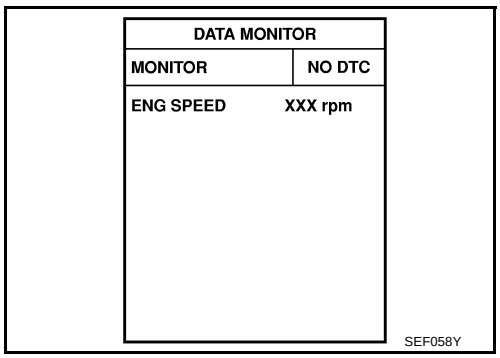
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION E

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-185, "MALFUNCTION E AND F" in “Diagnostic Procedure”.



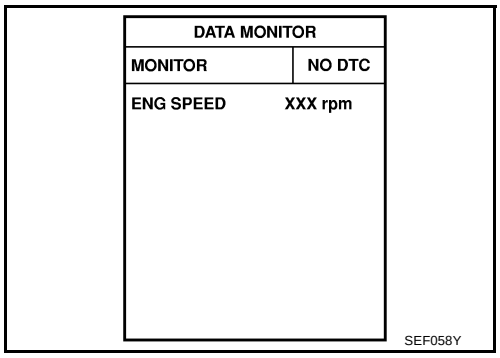
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION F

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-185, "MALFUNCTION E AND F" in “Diagnostic Procedure”.

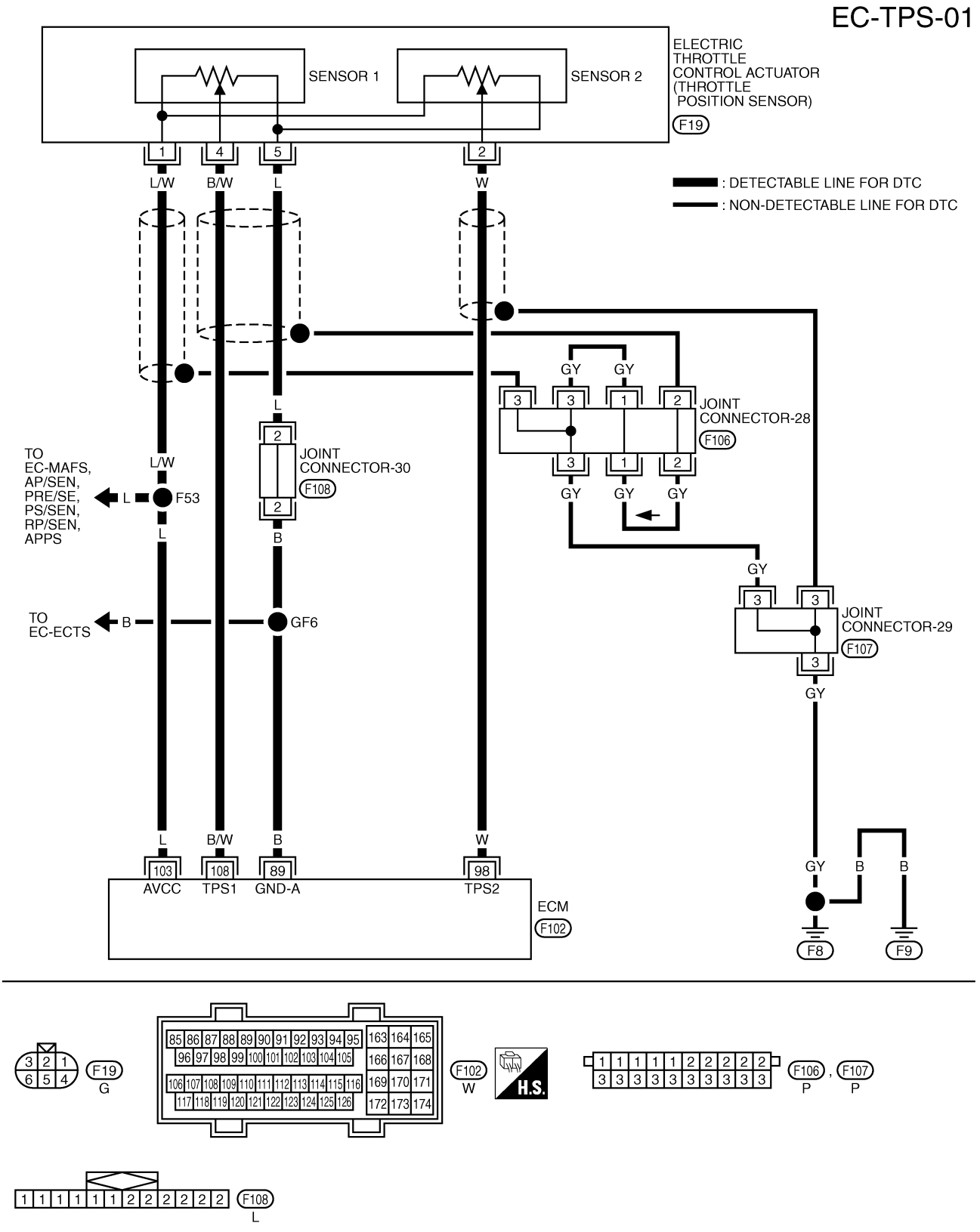


With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS002WF



TBWM0116E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
98	W	Throttle position sensor 2	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	More than 0.36V
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
108	B/W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	Less than 4.75V

Diagnostic Procedure

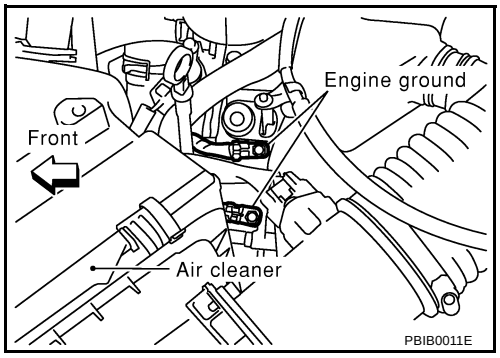
EBS002WG

MALFUNCTION A, B, C, D AND G

1. RETIGHTEN GROUND SCREWS

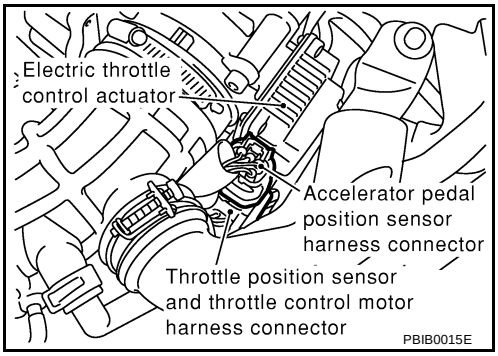
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



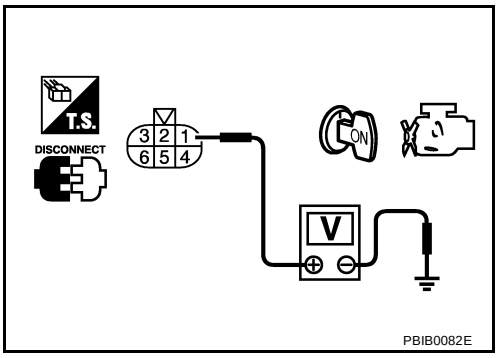
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector F19.
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.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and electric throttle control actuator
- Harness for short between ECM and accelerator pedal position sensor
- Harness for short between ECM and mass air flow sensor
- Harness for short between ECM and power steering pressure sensor
- Harness for short between ECM and refrigerant pressure sensor
- Harness for short between ECM and absolute pressure sensor
- Harness for short between ECM and EVAP control system pressure sensor
- ECM pin terminal

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

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between electric throttle control actuator terminal 5 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-30
- Harness for open or short between ECM and electric throttle control actuator

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

6. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 98 and electric throttle control actuator terminal 2, ECM terminal 108 and electric throttle control actuator terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect joint connector-28 and joint connector-29.
3. Check the following.

- Continuity between joint connector-28 terminals 1 and 2, 1 and 3
- Continuity between joint connector-28 terminal 3 and joint connector-29 terminal 3
- Continuity between joint connector-29 terminal 3 and engine ground
- Joint connector-28 and joint connector-29
  (Refer to PG-26, "Harness Layout" .)
  Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-28 and joint connector-29.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-185, "Component Inspection" .

OK or NG

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

9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

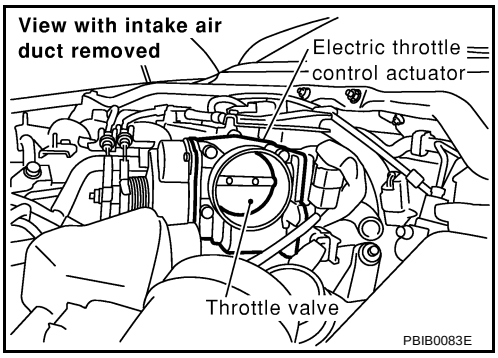
MALFUNCTION E AND F

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-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

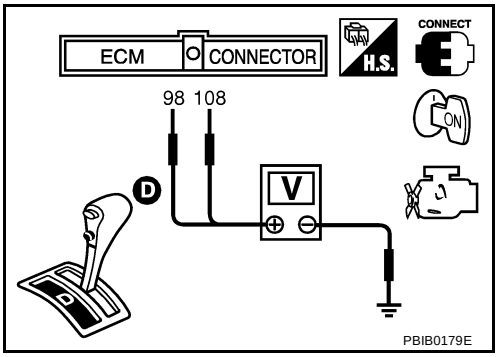
Component Inspection

EBS002G4

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position.
5. Check voltage between ECM terminals 98 (TP sensor 2), 108 (TP sensor 1) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
98 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V
108 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-45, "Throttle Valve Closed Position Learning" .
8. Perform EC-45, "Idle Air Volume Learning" .

Remove and Installation

EBS002G5

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-17, "INTAKE MANIFOLD" .

DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR

PFP:16119

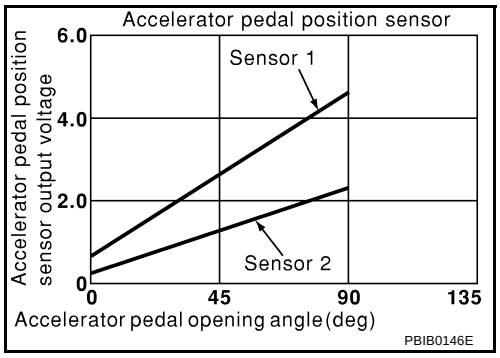
Component Description

EBS002KZ

Electric Throttle Control Actuator consists of throttle control motor, acceleration pedal position sensor, throttle position sensor, etc.

Accelerator pedal position sensor is connected to the accelerator pedal through the throttle drum and accelerator wire, and detects the accelerator pedal position by the throttle drum rotation angle.

Accelerator pedal position sensor has the 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

EBS002L0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2	● Ignition switch: ON (engine stopped) ● Shift lever: D	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON ● Shift lever: D	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

On Board Diagnosis Logic

EBS002L1

This self-diagnosis has the one trip detection logic for type II or type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .).

Malfunction is detected when

(Malfunction A) an excessively low or high voltage from the accelerator pedal position sensor 1 is sent to ECM,

(Malfunction B) an excessively low or high voltage from the accelerator pedal position sensor 2 is sent to ECM,

(Malfunction C) a difference between signals from sensor 1 and sensor 2 is out of the specified range.

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction A, B or C is detected.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	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 of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
Malfunction B	
Malfunction C	

Possible Cause

EBS002L2

- Harness or connectors
  (The accelerator pedal position sensor 1 or 2 circuit is open or shorted.)
- Electric throttle control actuator

DTC Confirmation Procedure

EBS002L3

NOTE:

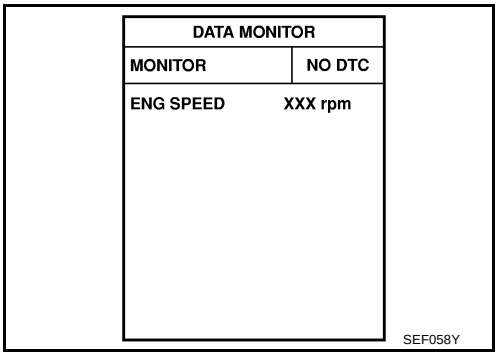
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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 (1st trip) DTC is detected, go to EC-189, "Diagnostic Procedure" .

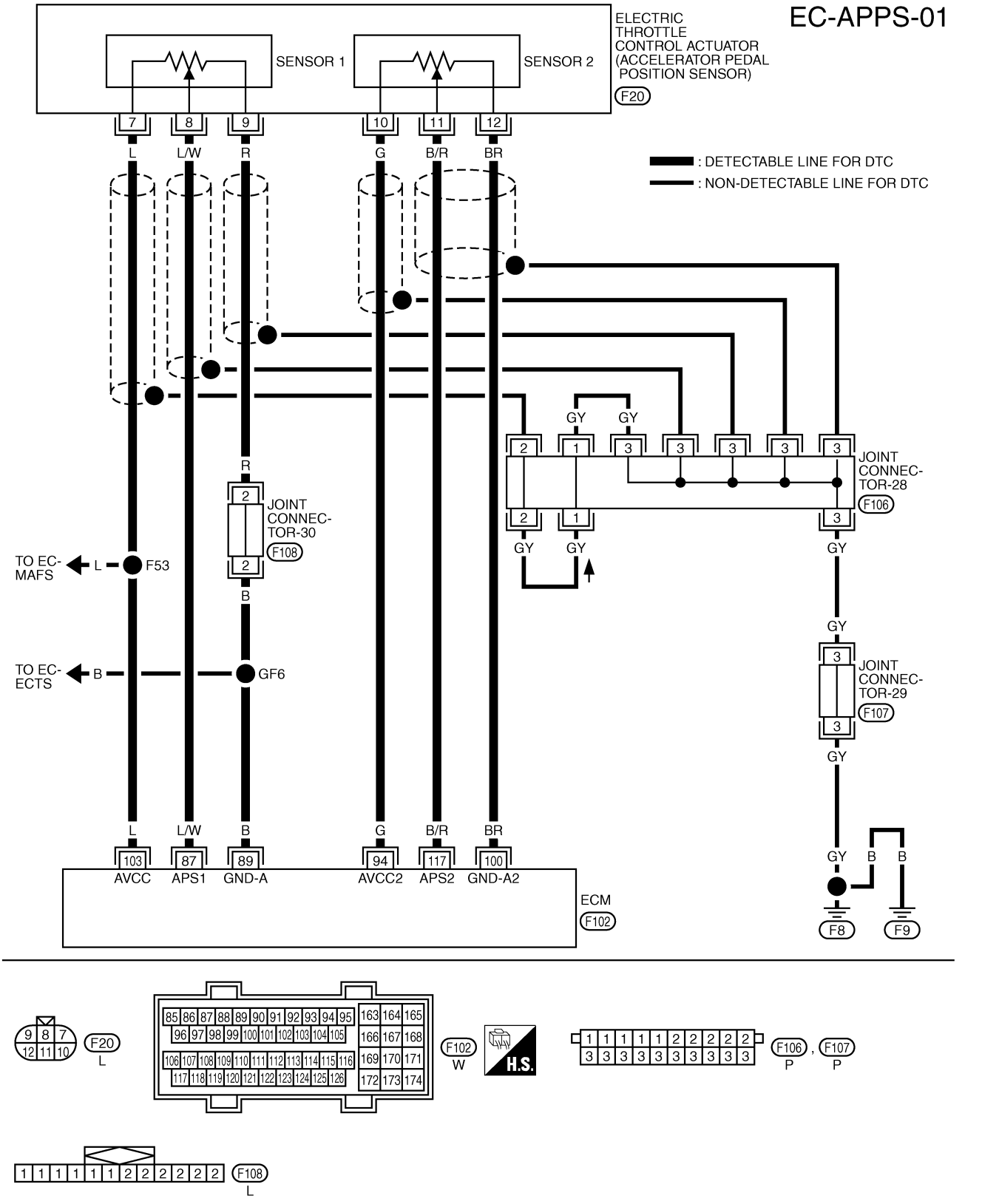


WITH GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS002L4



TBWM0119E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
87	L/W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
94	G	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	2.0 - 3.0V
100	BR	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
117	B/R	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Gear position is "D" ● Accelerator pedal fully released	More than 0.18V
			[Ignition switch "ON"] ● Gear position is "D" ● Accelerator pedal fully depressed	Less than 2.37V

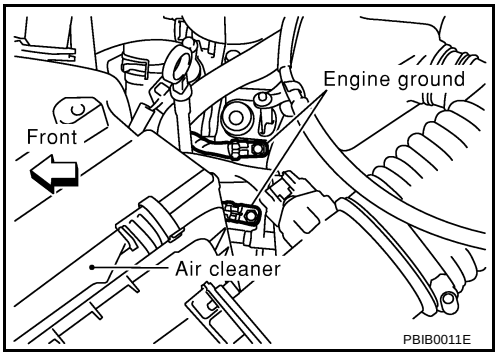
Diagnostic Procedure

EBS002L5

1. RETIGHTEN GROUND SCREWS

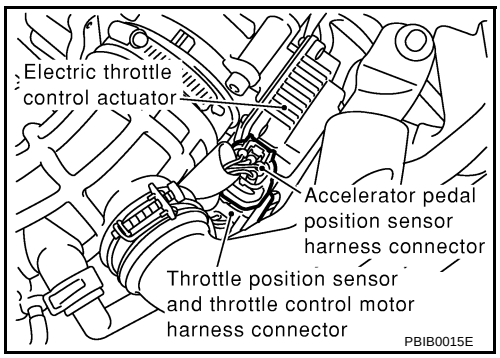
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



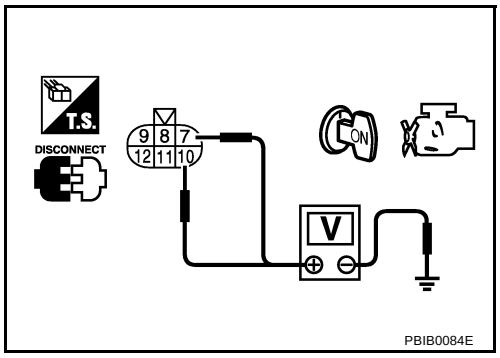
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector F20.
2. Turn ignition switch “ON”.



3. Check voltage between electric throttle control actuator terminals 7, 10 and ground with CONSULT-II or tester.

Electric throttle control actuator terminal	Voltage (V)
7	Approximately 5
10	Approximately 2.5



OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between electric throttle control actuator terminal 9, 12 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-30
- Harness for open or short between ECM and electric throttle control actuator

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

5. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 87 and electric throttle control actuator terminal 8, ECM terminal 117 and electric throttle control actuator terminal 11.
   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 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect joint connector-28 and joint connector-29.
3. Check the following.

- Continuity between joint connector-28 terminals 1 and 2, 1 and 3
- Continuity between joint connector-28 terminal 3 and joint connector-29 terminal 3
- Continuity between joint connector-29 terminal 3 and engine ground
- Joint connector-28 and joint connector-29
  (Refer to PG-26, "Harness Layout" .)
  Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-28 and joint connector-29.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK APP SENSOR

Refer to EC-192, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

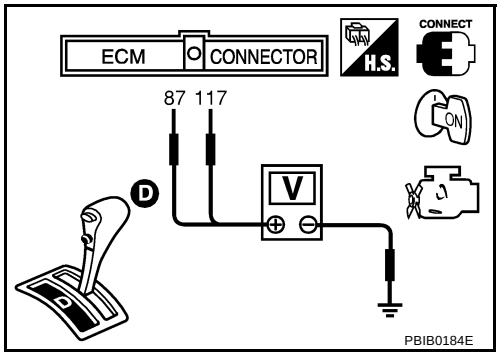
>> **INSPECTION END**

Component Inspection

EBS002L6

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position.
5. Check voltage between ECM terminals 87 (APP sensor 1 signal), 117 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
87 (Accelerator pedal position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
117 (Accelerator pedal position sensor 2)	Fully released	More than 0.18V
	Fully depressed	Less than 2.37V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-45, "Throttle Valve Closed Position Learning" .
8. Perform EC-45, "Idle Air Volume Learning" .

Remove and Installation

EBS002L7

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-17, "INTAKE MANIFOLD" .

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

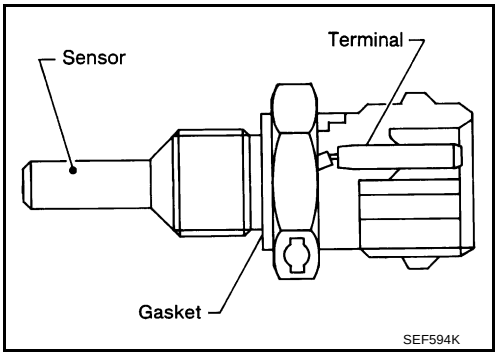
PFP:22630

Component Description

EBS002G6

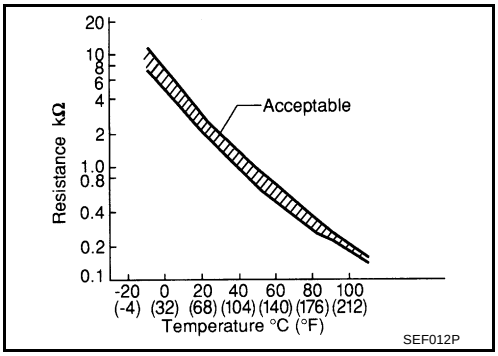
NOTE:
If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC-173 .

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 121 (Engine coolant temperature sensor) and body 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

EBS002G7

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

Possible Cause

EBS002G8

- Harness or connectors
  (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

DTC Confirmation Procedure

EBS002G9

CAUTION:
Be careful not to overheat engine.

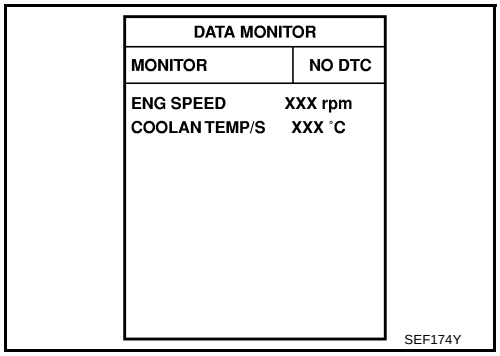
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.

If it is below 10°C (50°F), go to following step.

4. Start engine and run it for 65 minutes at idle speed.
   If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure"
   .



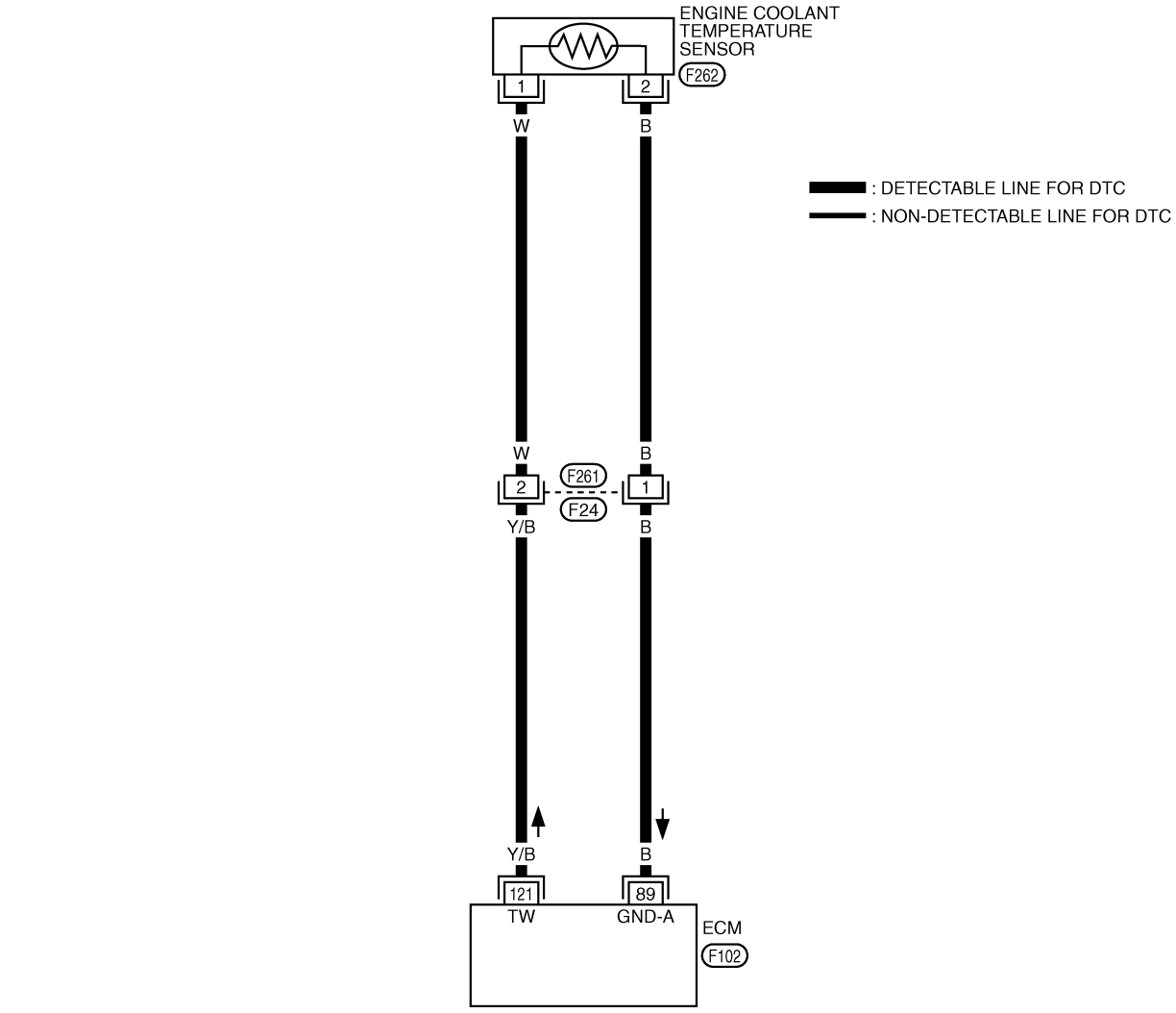
WITH GST

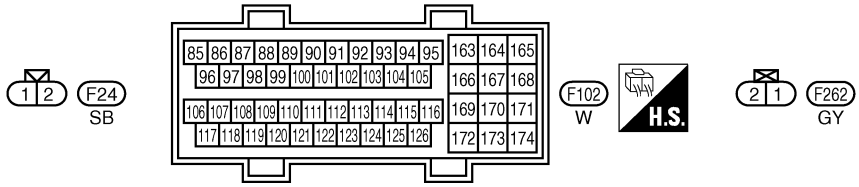
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

EBS002GA

EC-ECTS-01





TBWM0009E

Diagnostic Procedure

EBS002GB

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-196, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace engine coolant temperature sensor.

2. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace thermostat. Refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

3. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

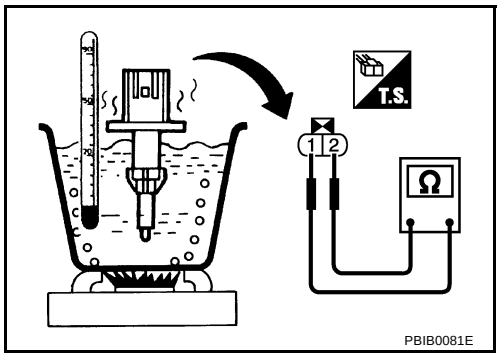
>> **INSPECTION END**

Component Inspection

EBS002QR

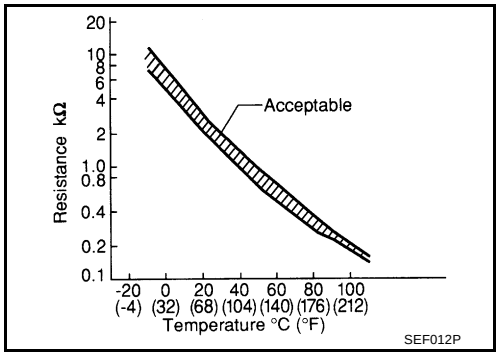
ENGINE COOLANT TEMPERATURE SENSOR

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 121 (Engine coolant temperature sensor) and body ground.

2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS002QS

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-55, "CYLINDER HEAD" .

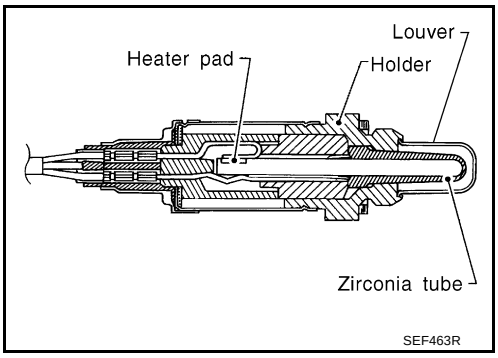
DTC P0130 (BANK 1), P0150 (BANK 2) HO2S1 (CIRCUIT)

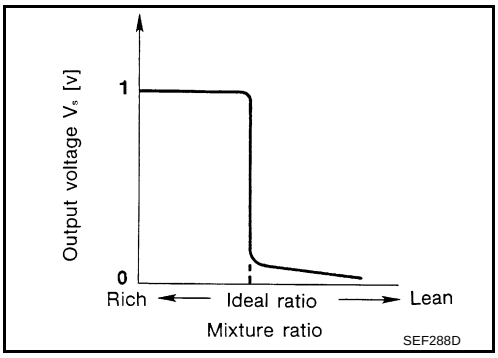
PFP:22690

Component Description

EBS002F5

The heated oxygen sensor 1 is placed into the front tube. 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

EBS002F6

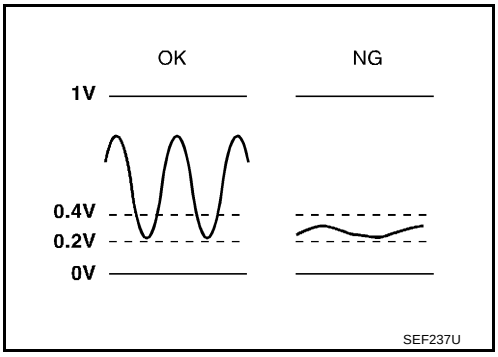
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS002F7

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.
Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.



Possible Cause

EBS002F8

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

DTC Confirmation Procedure

EBS002F9

CAUTION:
Always drive vehicle at a safe speed.

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

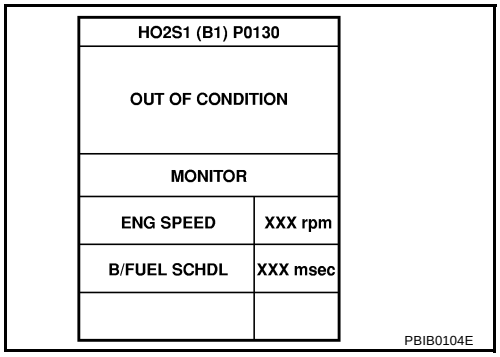
TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

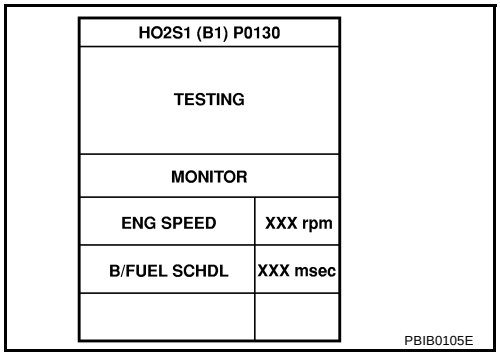
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1) P0130” or “HO2S1 (B2) P0150” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

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



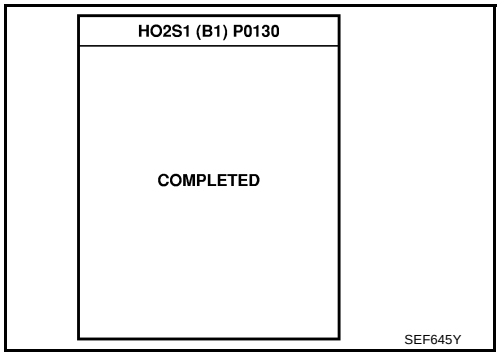
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,100 - 3,600 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.6 - 12.0 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-203, "Diagnostic Procedure" .
   During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

EBS002FA

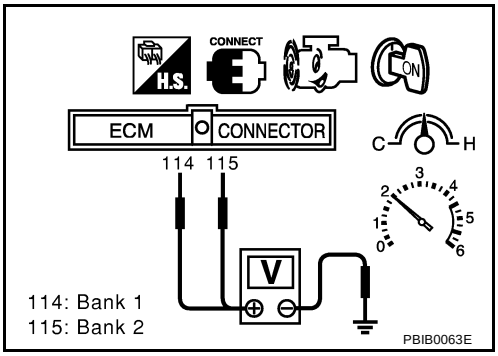
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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.

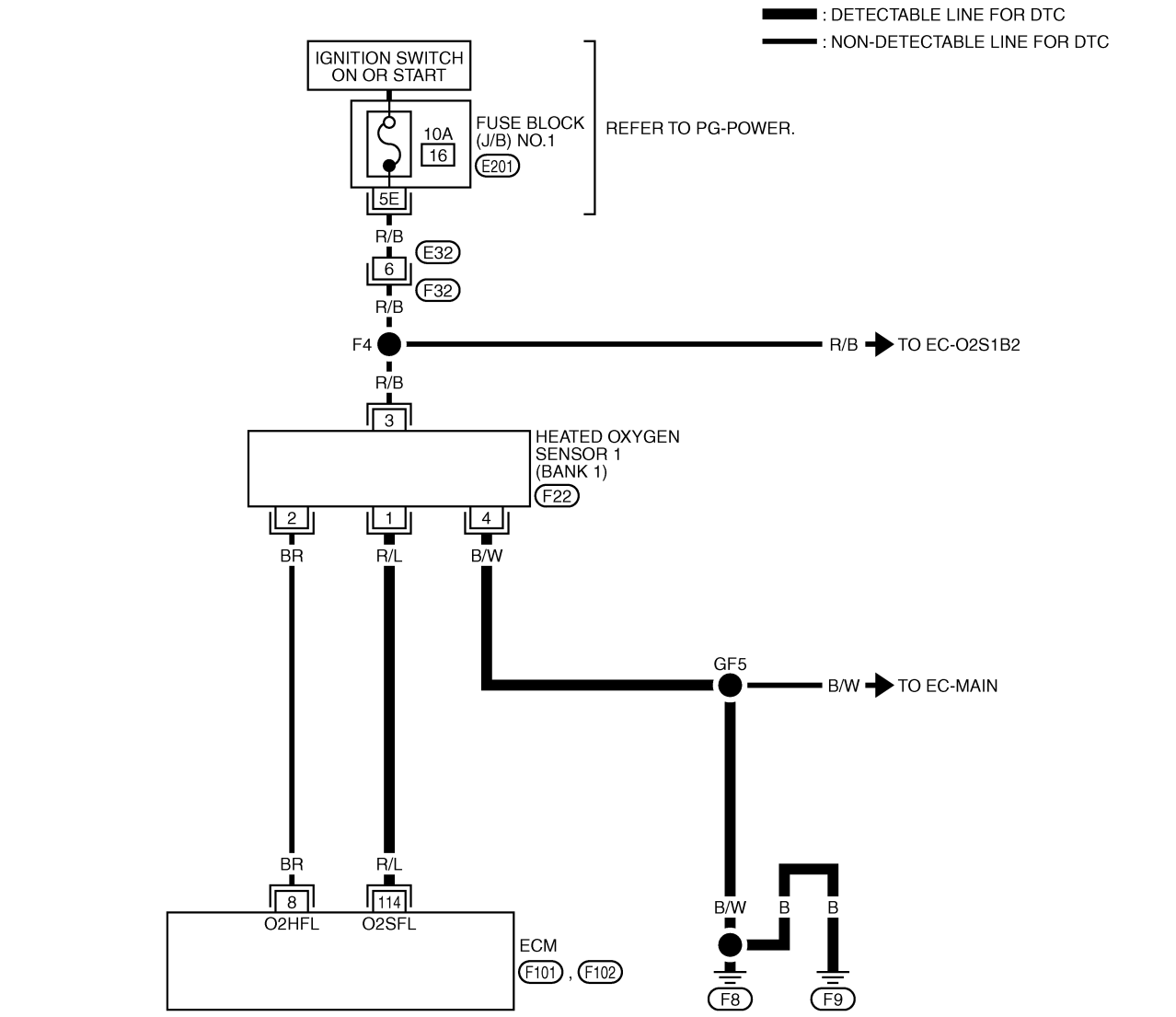
4. If NG, go to EC-203, "Diagnostic Procedure" .

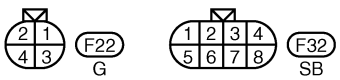


Wiring Diagram
BANK 1

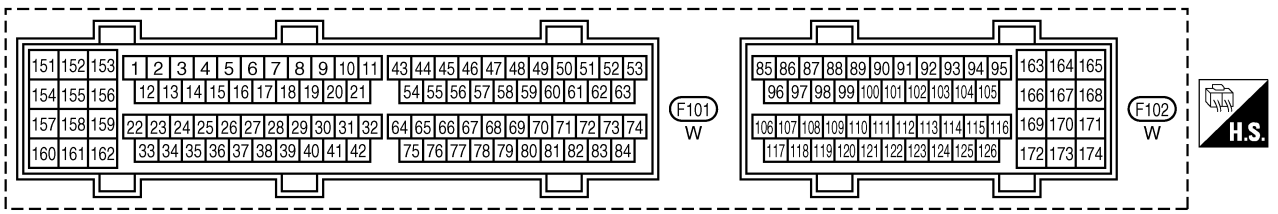
EBS002FB

EC-O2S1B1-01





REFER TO THE FOLLOWING.
E201 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1



TBWM0107E

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

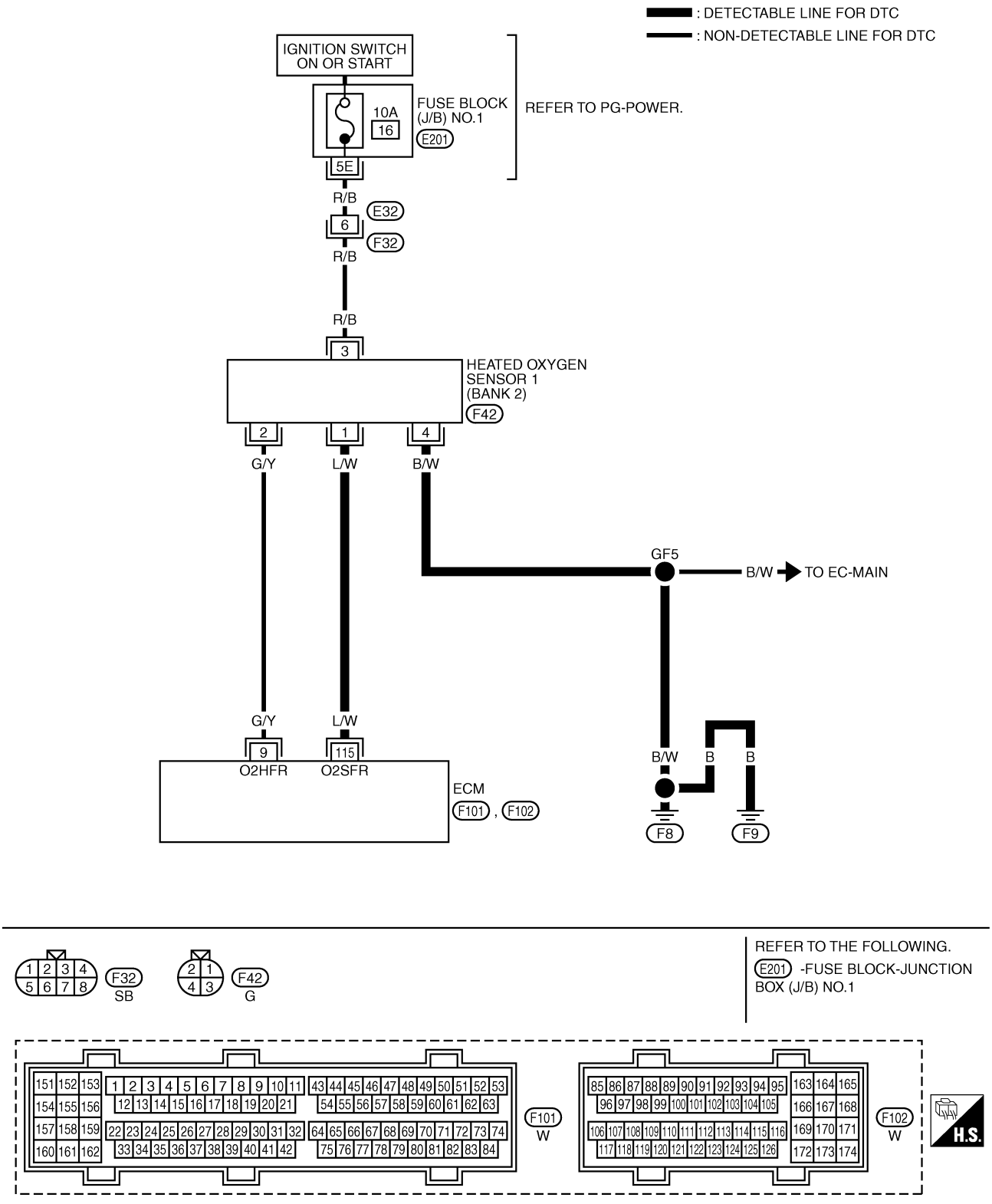
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	R/L	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

BANK 2

EC-O2S1B2-01



TBWM0108E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

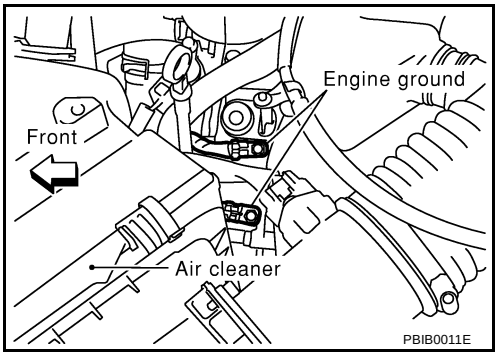
Diagnostic Procedure

EBS002FC

1. INSPECTION START

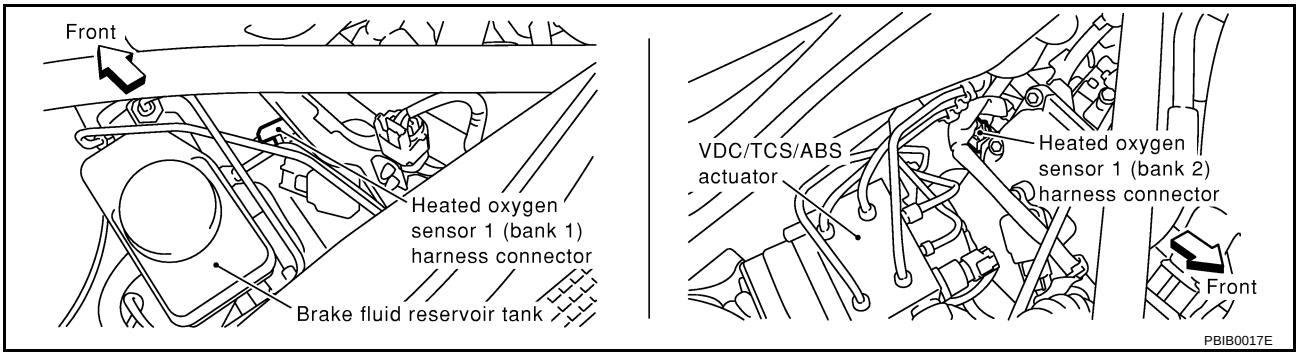
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect HO2S1 harness connector.



2. Check harness continuity between HO2S1 terminal 4 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit 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 and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0130	114	1	1
P0150	115	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0130	114 or 1	Ground	1
P0150	115 or 1	Ground	2

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 HEATED OXYGEN SENSOR 1

Refer to EC-204, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002FD

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)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1

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

Bank 2

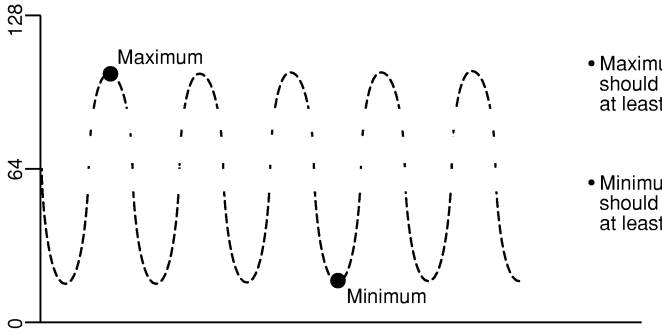
cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

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



SEF648Y

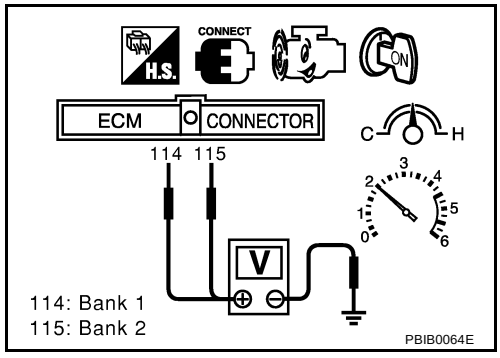
CAUTION:

- **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 heated oxygen sensor, clean exhaust system threads using Heated 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 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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



PBIB0064E

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002FE

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

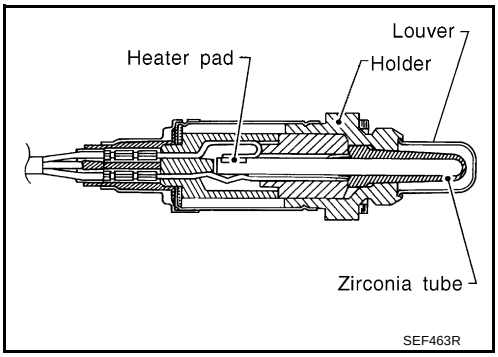
DTC P0131 (BANK 1), P0151 (BANK 2) HO2S1 (LEAN SHIFT MONITORING)

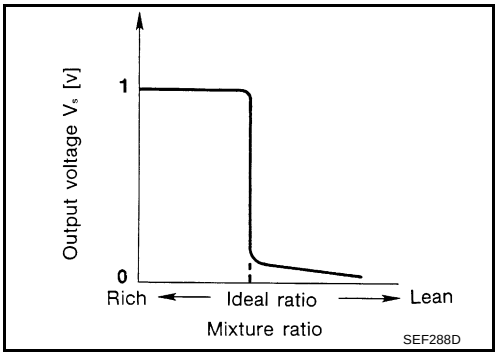
PFP:22690

Component Description

EBS002LY

The heated oxygen sensor 1 is placed into the front tube. 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

EBS002LZ

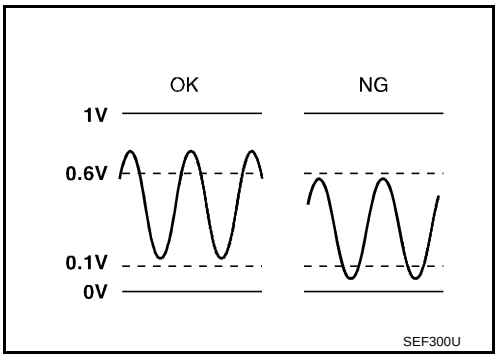
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS002GO

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. Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.



Possible Cause

EBS002GP

- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

EBS002GQ

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:

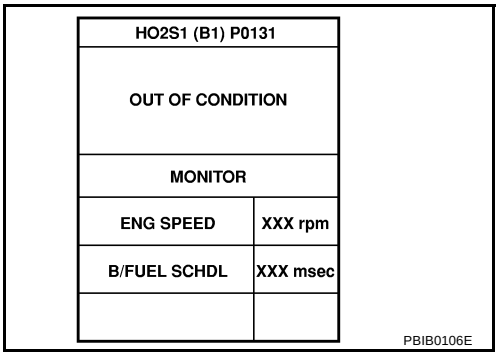
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

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) P0131” or “HO2S1 (B2) P0151” 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:

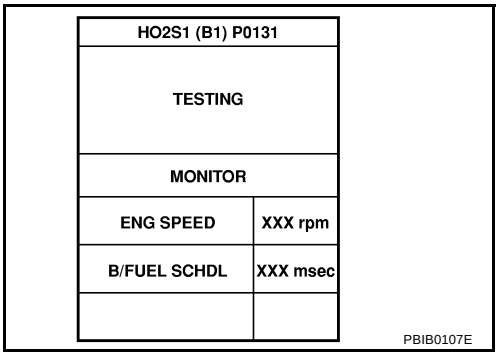
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

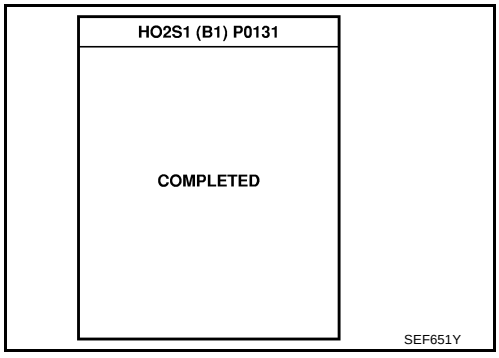


6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,100 - 2,000 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.6 - 12.0 msec
Selector lever	Suitable position

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-209, "Diagnostic Procedure" .

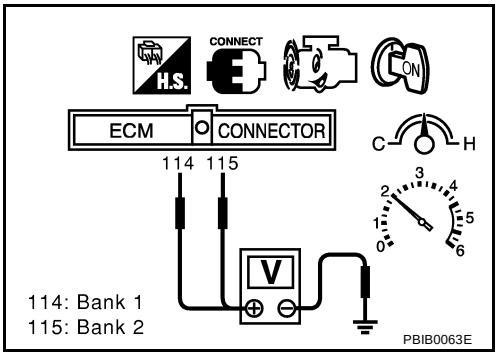
Overall Function Check

EBS002GR

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

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 114 [HO2S1(B1) signal] or 115 [HO2S1(B2) 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-209, "Diagnostic Procedure" .



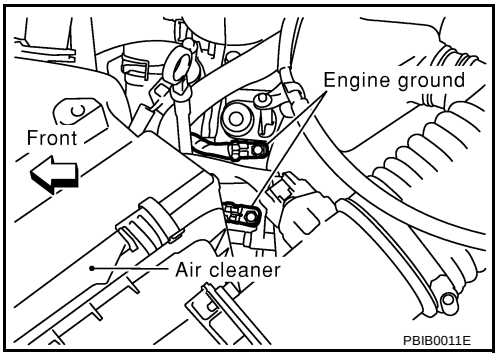
Diagnostic Procedure

EBS002GS

1. RETIGHTEN GROUND SCREWS

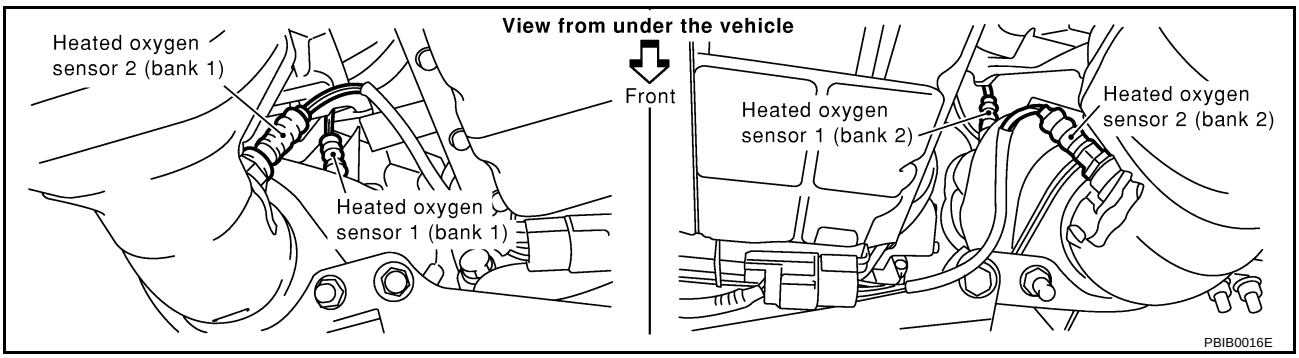
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.



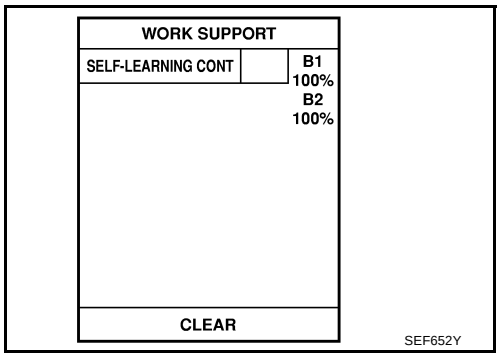
Tightening torque: **40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)**

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA

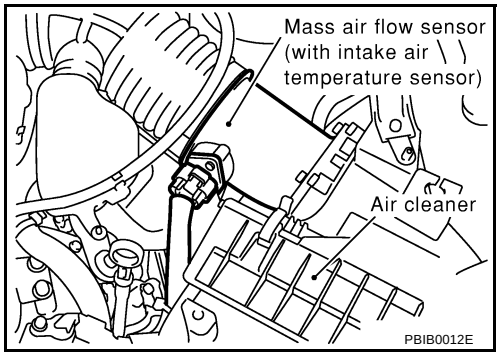
With CONSULT-II

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 or P0174 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-301 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-247, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-211, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-200, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS002M0

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)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

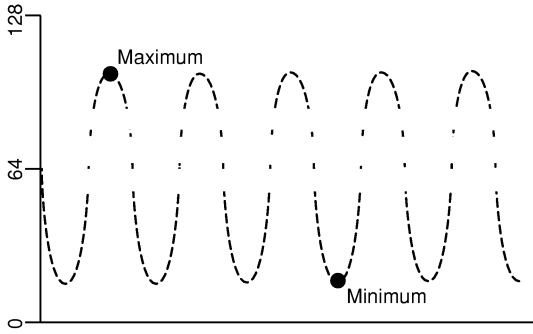
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

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



CAUTION:

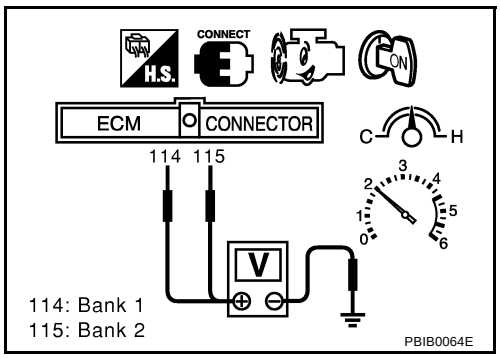
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 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 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002GU

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

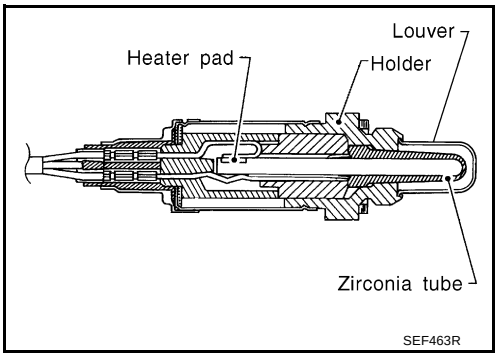
DTC P0132 (BANK 1), P0152 (BANK 2) HO2S1 (RICH SHIFT MONITORING)

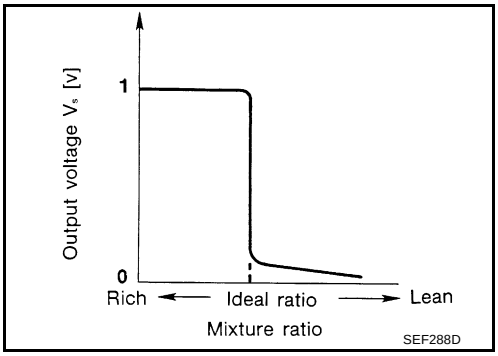
PFP:22690

Component Description

EBS002M1

The heated oxygen sensor 1 is placed into the front tube. 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

EBS002M2

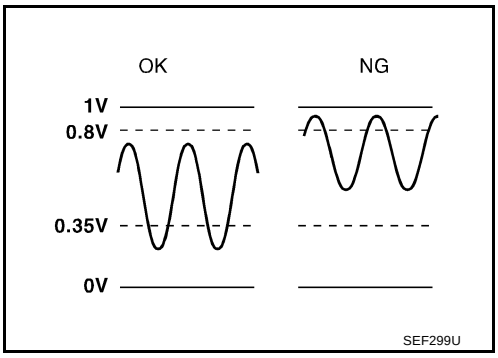
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS002GX

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.
Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.



Possible Cause

EBS002GY

- Heated oxygen sensor 1
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater

DTC Confirmation Procedure

EBS002GZ

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:

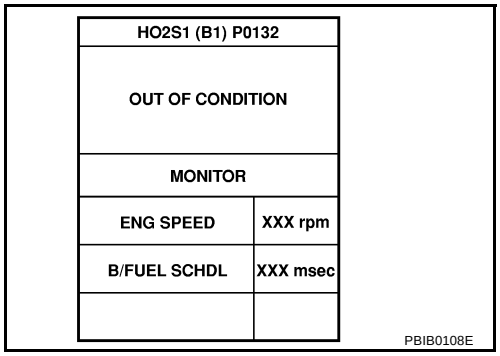
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

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) P0132” or “HO2S1 (B2) P0152” 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:

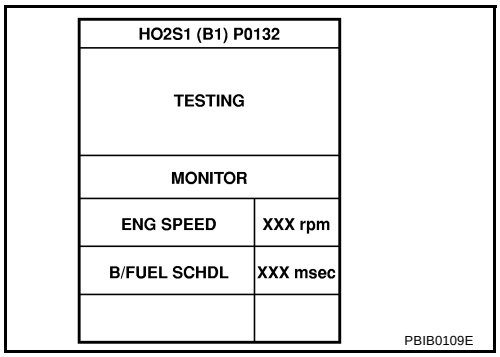
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

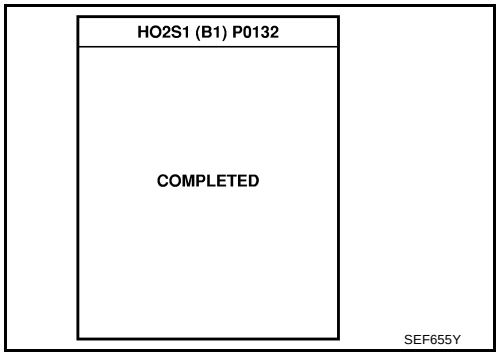


6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,100 - 2,000 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.6 - 12.0 msec
Selector lever	Suitable position

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-215, "Diagnostic Procedure" .

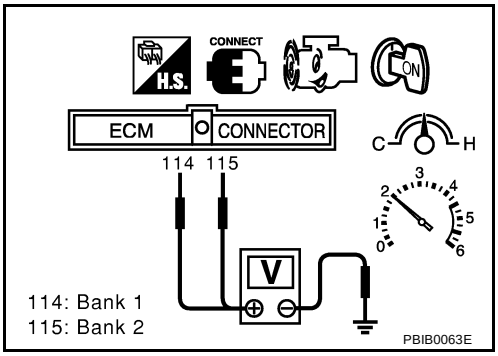
Overall Function Check

EBS002H0

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

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 114 [HO2S1(B1) signal] or 115 [HO2S1(B2) 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-215, "Diagnostic Procedure" .



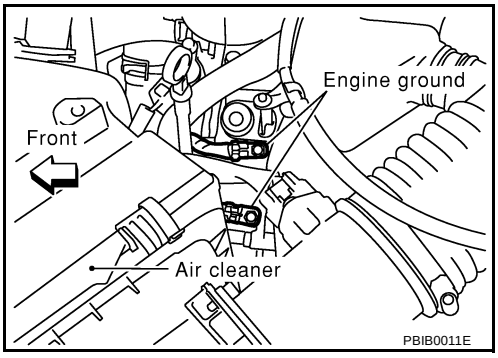
Diagnostic Procedure

EBS002H1

1. RETIGHTEN GROUND SCREWS

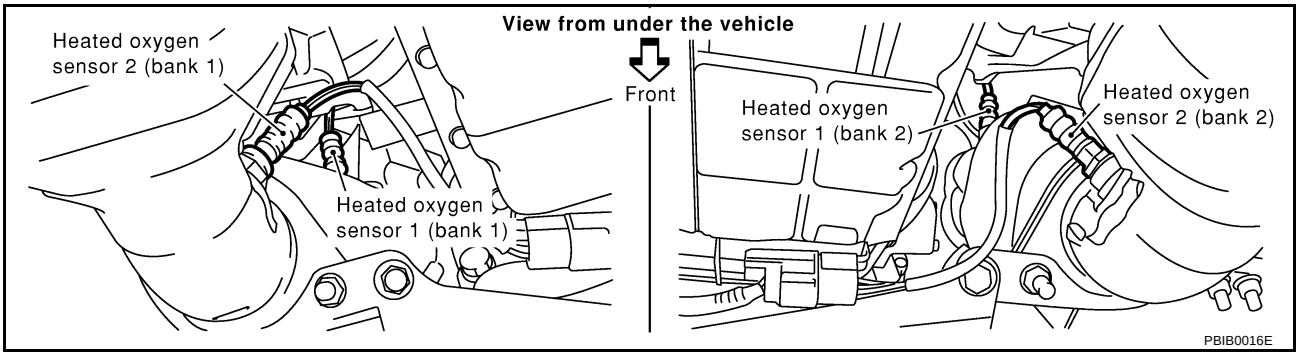
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.



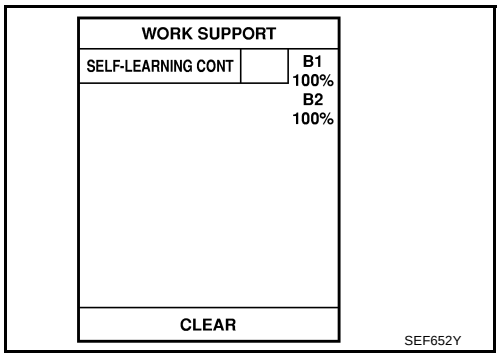
Tightening torque: **40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)**

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA

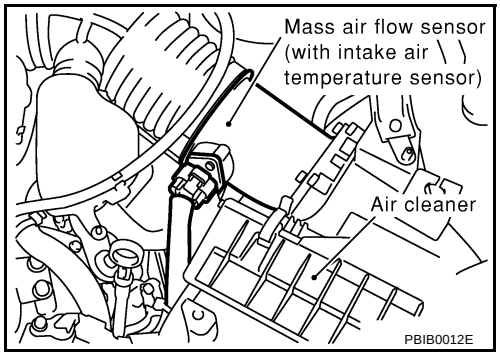
With CONSULT-II

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 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

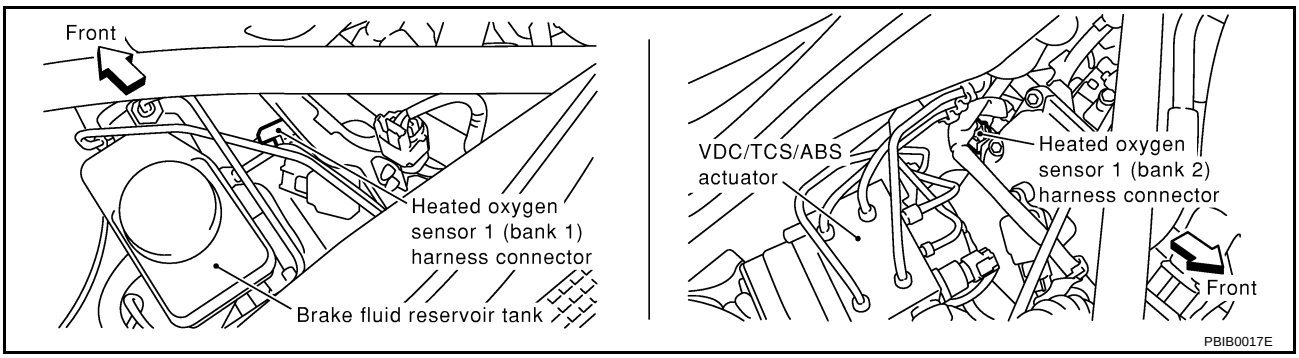


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-309 .
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-247, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-217, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-200, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS002OW

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)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1

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

Bank 2

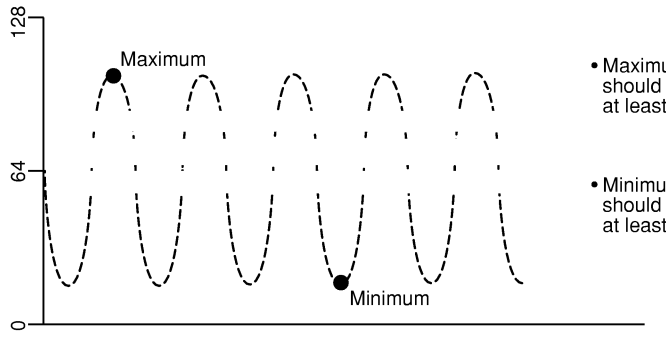
cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R	L	R	L	R	L	R	L	R	L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

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



SEF648Y

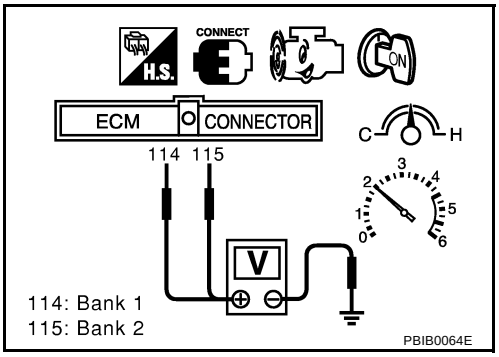
CAUTION:

- **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 heated oxygen sensor, clean exhaust system threads using Heated 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 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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



PBIB0064E

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002OX

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

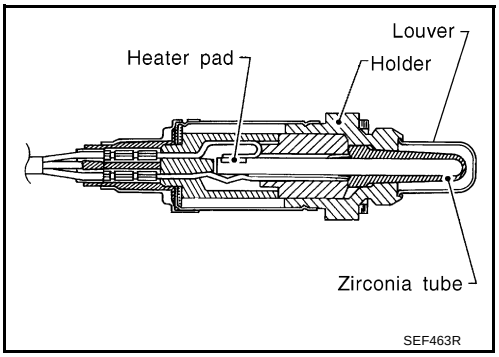
DTC P0133 (BANK 1), P0153 (BANK 2) HO2S1 (RESPONSE MONITORING)

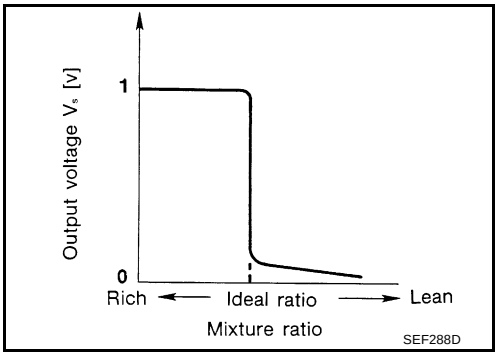
PFP:22690

Component Description

EBS002M4

The heated oxygen sensor 1 is placed into the front tube. 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

EBS002M5

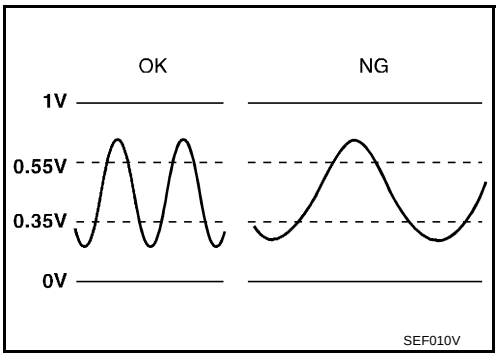
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS002H6

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.
Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.



Possible Cause

EBS002H7

- 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
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

EBS002H8

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.

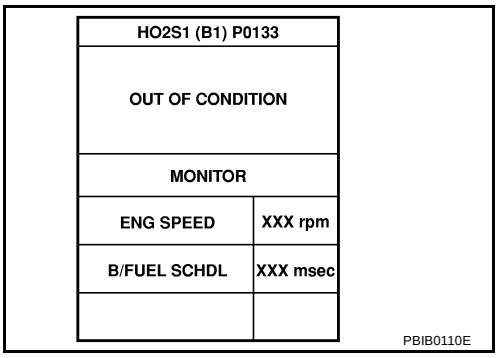
TESTING CONDITION:

- **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) P0133" or "HO2S1 (B2) P0153" 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.

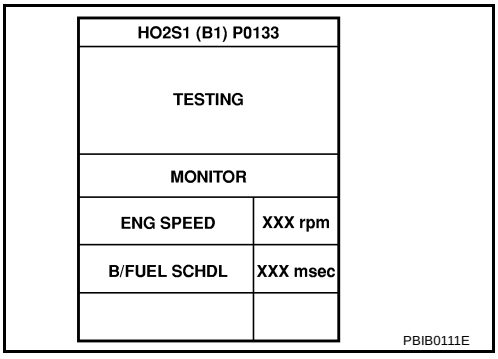
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

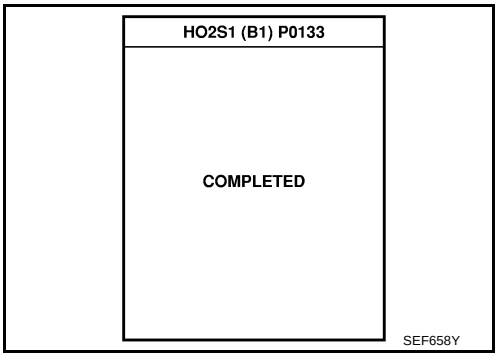


6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,350 - 2,400 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	1.6 - 12.0msec
Selector lever	Suitable position

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-226, "Diagnostic Procedure" .

Overall Function Check

EBS002H9

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

WITH GST

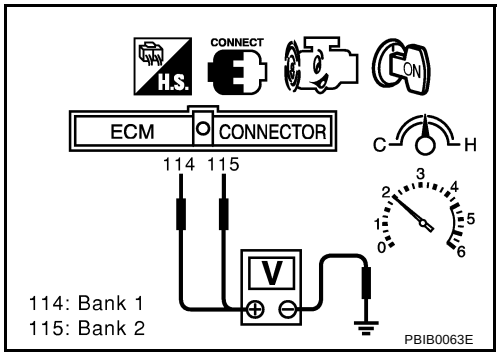
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 114 [HO2S1(B1) signal] or 115 [HO2S1(B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- 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 → 0 - 0.3V**

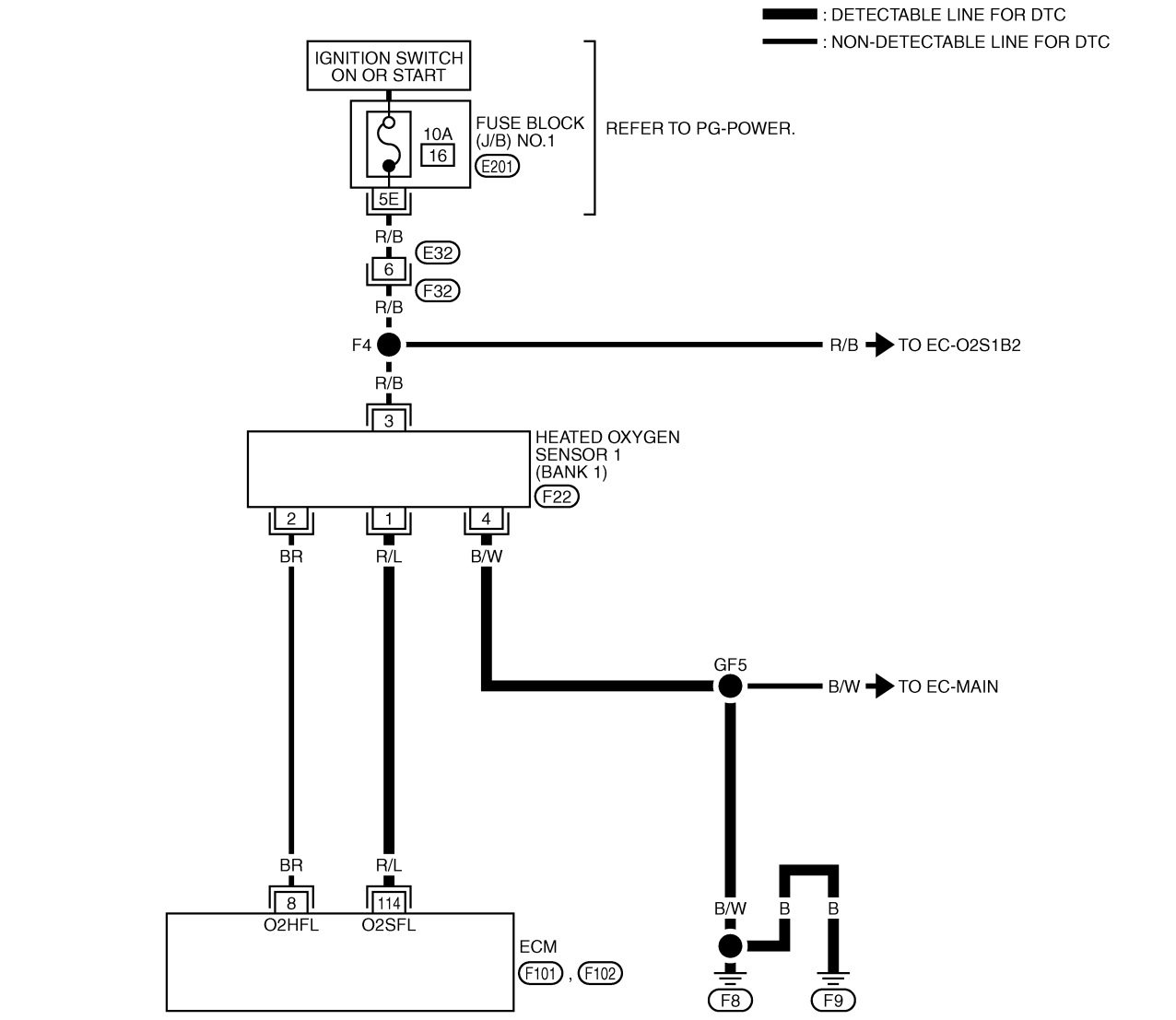
4. If NG, go to EC-226, "Diagnostic Procedure" .

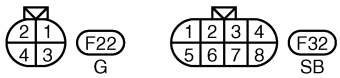


Wiring Diagram
BANK 1

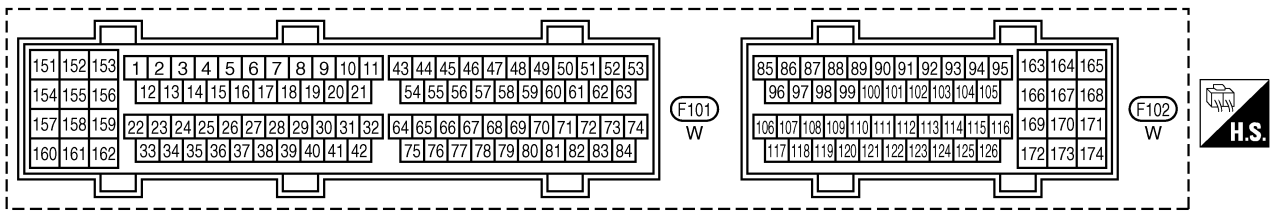
EBS002M6

EC-O2S1B1-01





REFER TO THE FOLLOWING.
E201 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1



TBWM0107E

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

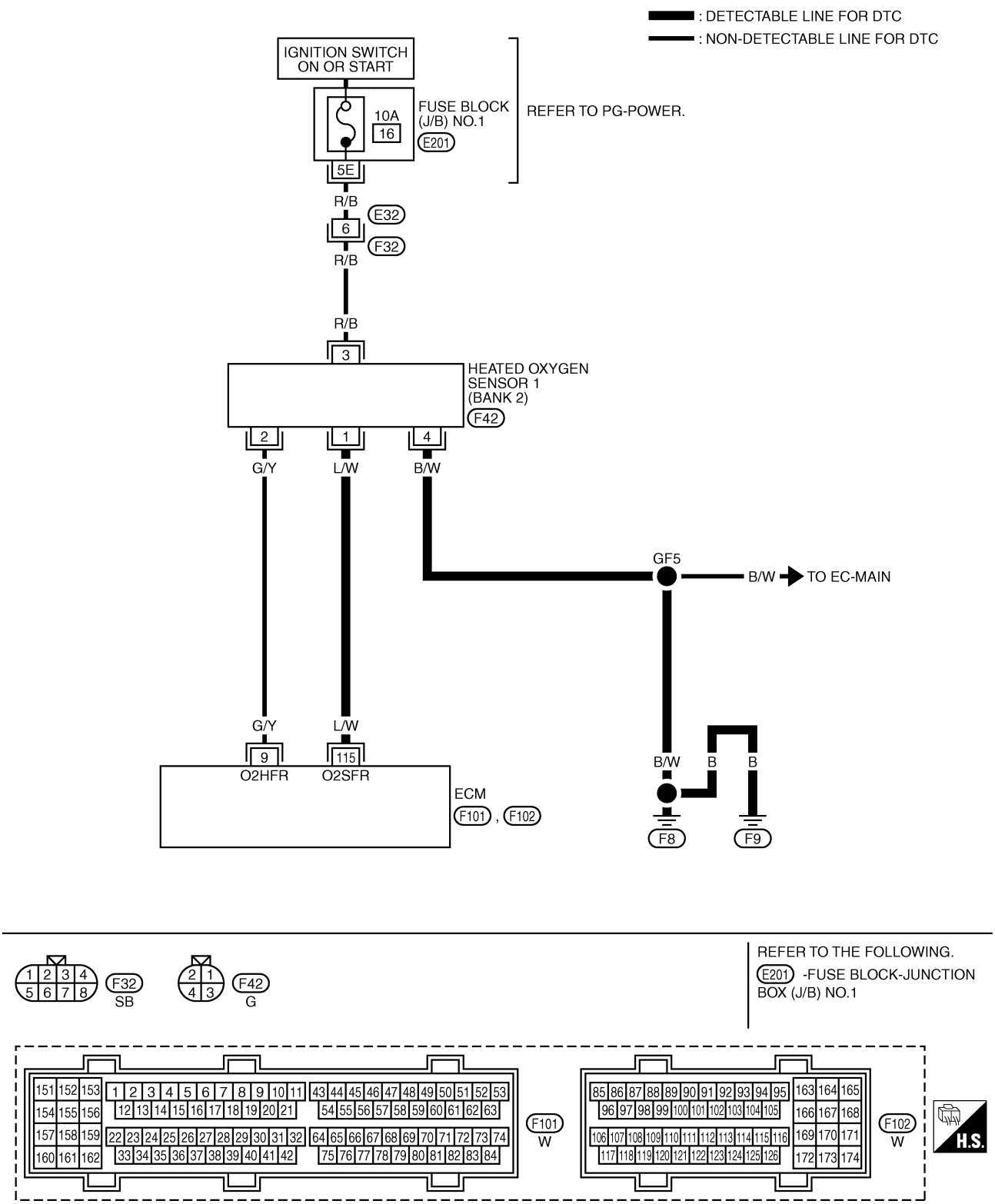
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	R/L	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

BANK 2

EC-O2S1B2-01



TBWM0108E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

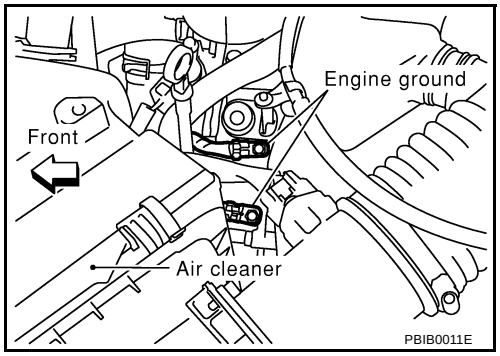
Diagnostic Procedure

EBS002HB

1. RETIGHTEN GROUND SCREWS

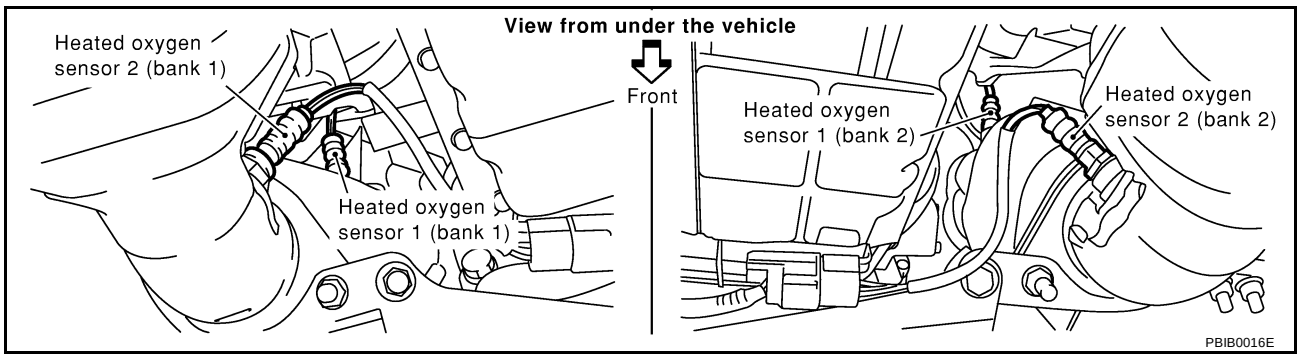
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

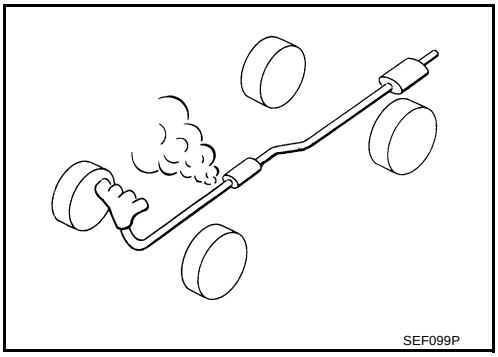


Tightening torque: **40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)**

>> GO TO 3.

3. CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

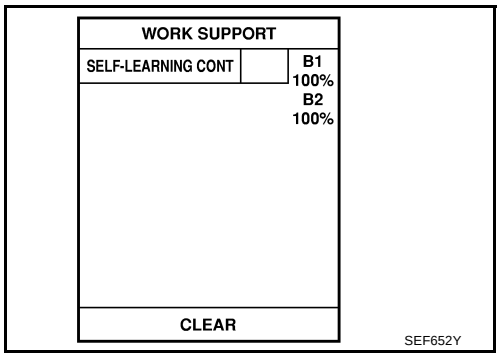
OK or NG

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

5. CLEAR THE SELF-LEARNING DATA

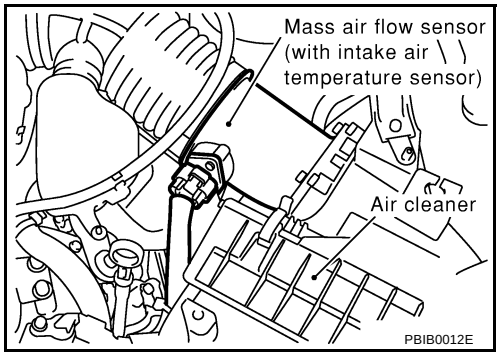
With CONSULT-II

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, P0172, P0174 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



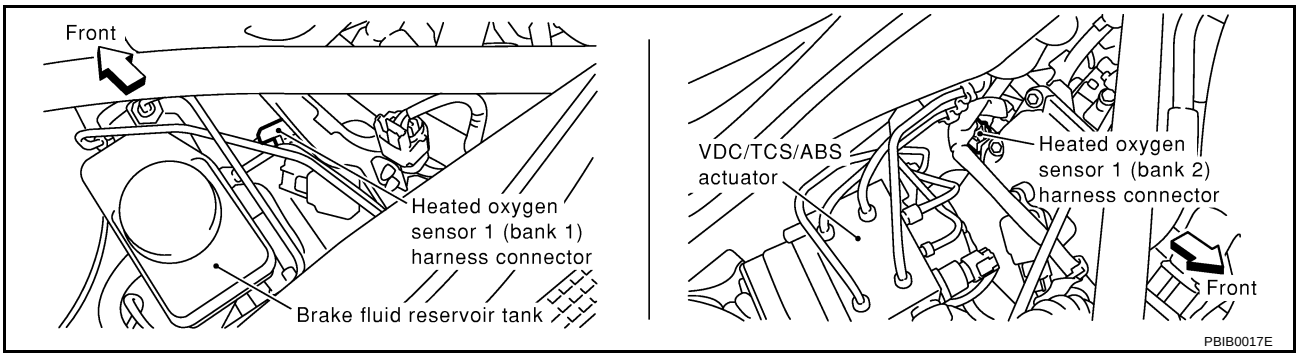
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, DTC P0172, P0174 or P0175 (Refer to EC-301 or EC-309).

No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORTED

1. Disconnect heated oxygen sensor 1 harness connector.



2. Check harness continuity between HO2S1 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0133	114	1	1
P0153	115	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0133	114 or 1	Ground	1
P0153	115 or 1	Ground	2

Continuity should not exist.

4. 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-247, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning heated oxygen sensor 1.

9. CHECK MASS AIR FLOW SENSOR

Refer to EC-162, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace mass air flow sensor.

10. CHECK PCV VALVE

Refer to EC-619, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace PCV valve.

11. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-230, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace malfunctioning heated oxygen sensor 1.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

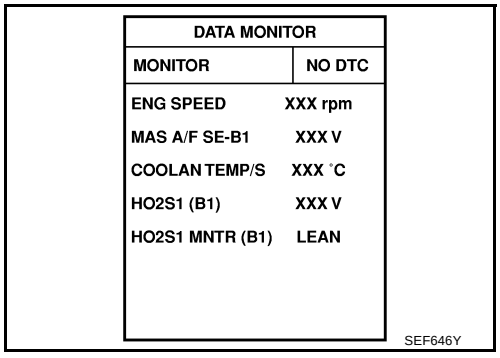
Component Inspection

EBS002OY

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)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - "HO2S1 MNTR (B1)/(B2)" 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)/(B2)" voltage goes above 0.6V at least once.
   - "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
   - "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

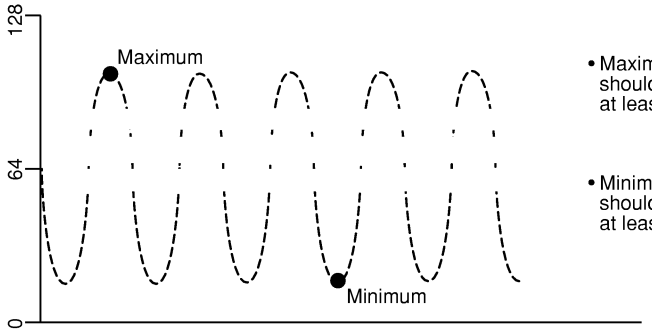
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

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



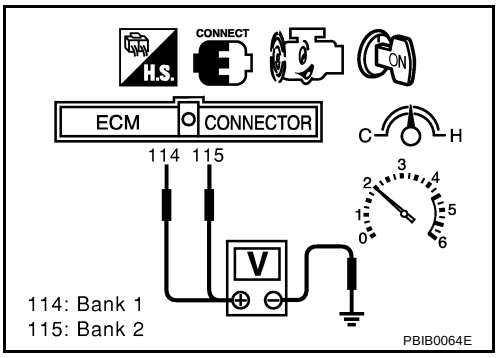
SEF648Y

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 heated oxygen sensor, clean exhaust system threads using Heated 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 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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



PBIB0064E

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002M9

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

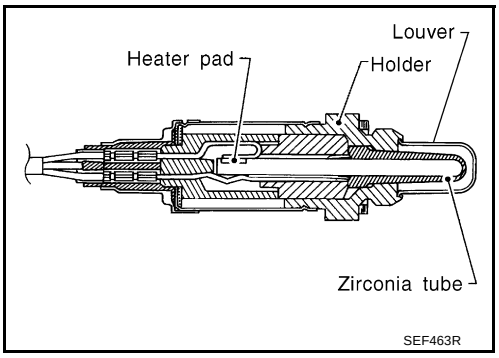
DTC P0134 (BANK 1), P0154 (BANK 2) HO2S1 (HIGH VOLTAGE)

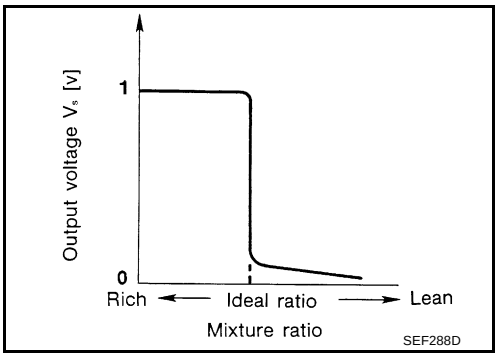
PFP:22690

Component Description

EBS002MA

The heated oxygen sensor 1 is placed into the front tube. 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

EBS002MB

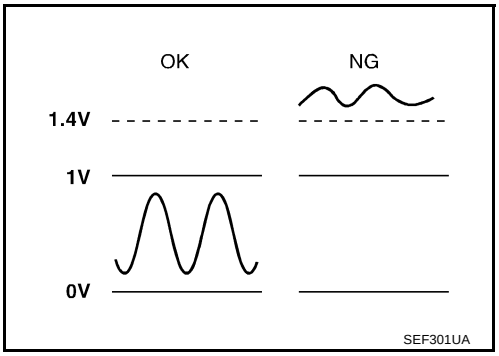
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS002HG

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.



Possible Cause

EBS002HH

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

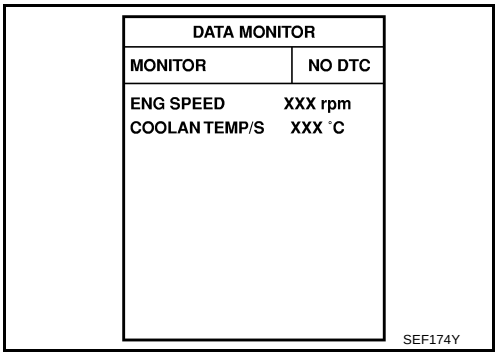
DTC Confirmation Procedure

EBS002HI

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 25 seconds.
6. If 1st trip DTC is detected, go to EC-237, "Diagnostic Procedure" .



WITH GST

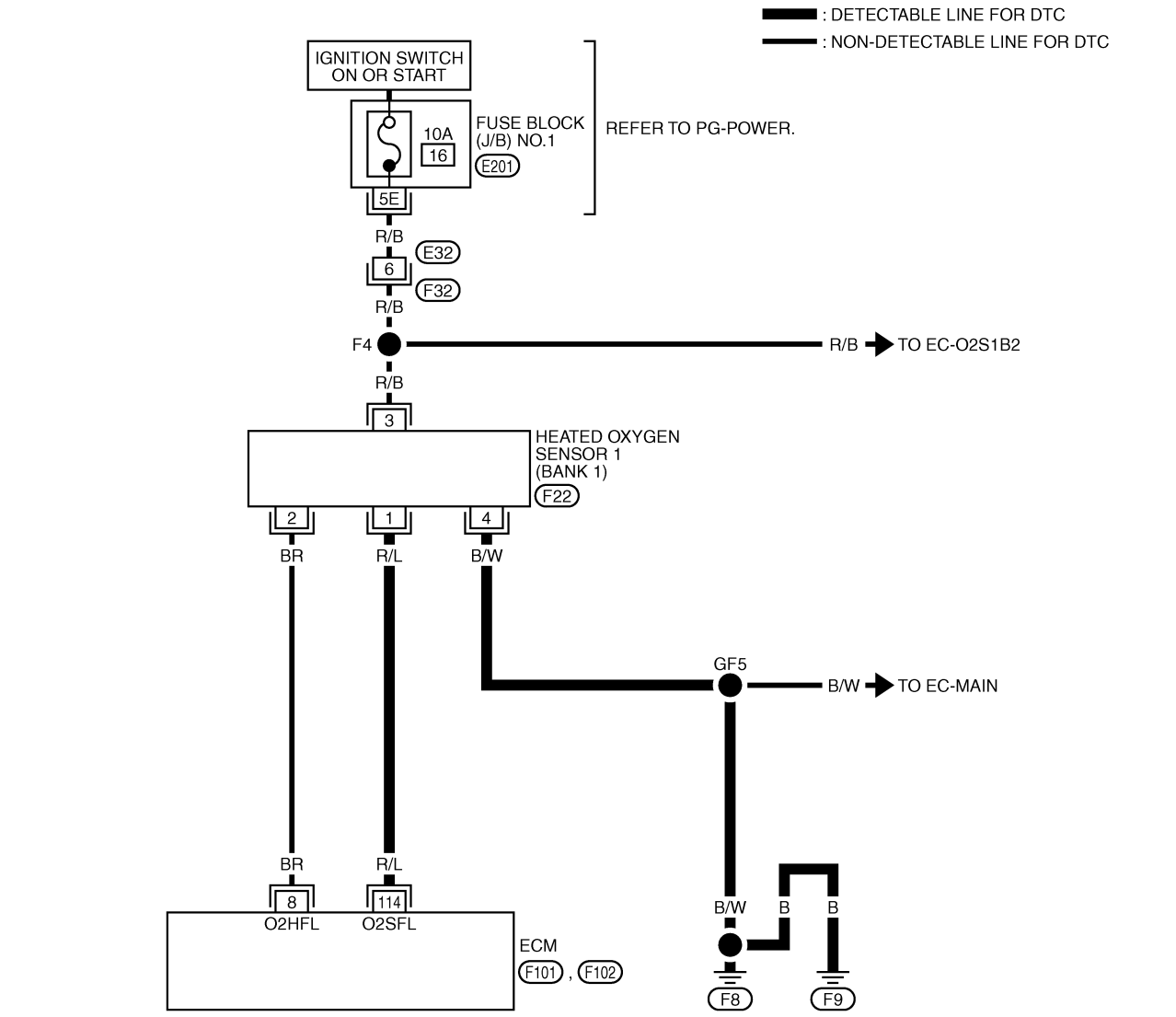
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 25 seconds.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Restart engine and let it idle for 25 seconds.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-237, "Diagnostic Procedure" .

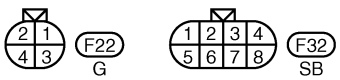
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram
BANK 1

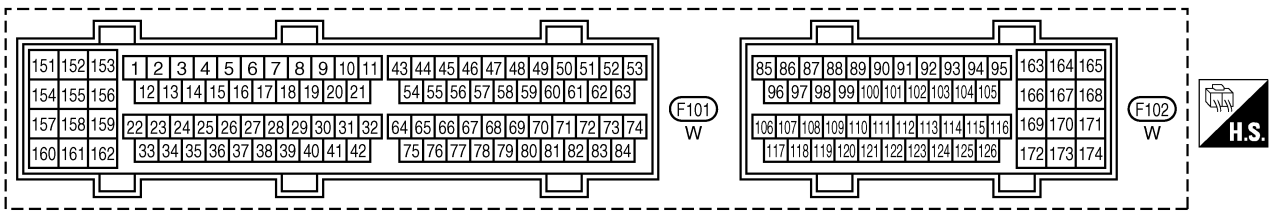
EBS002MC

EC-O2S1B1-01





REFER TO THE FOLLOWING.
E201 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1



TBWM0107E

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

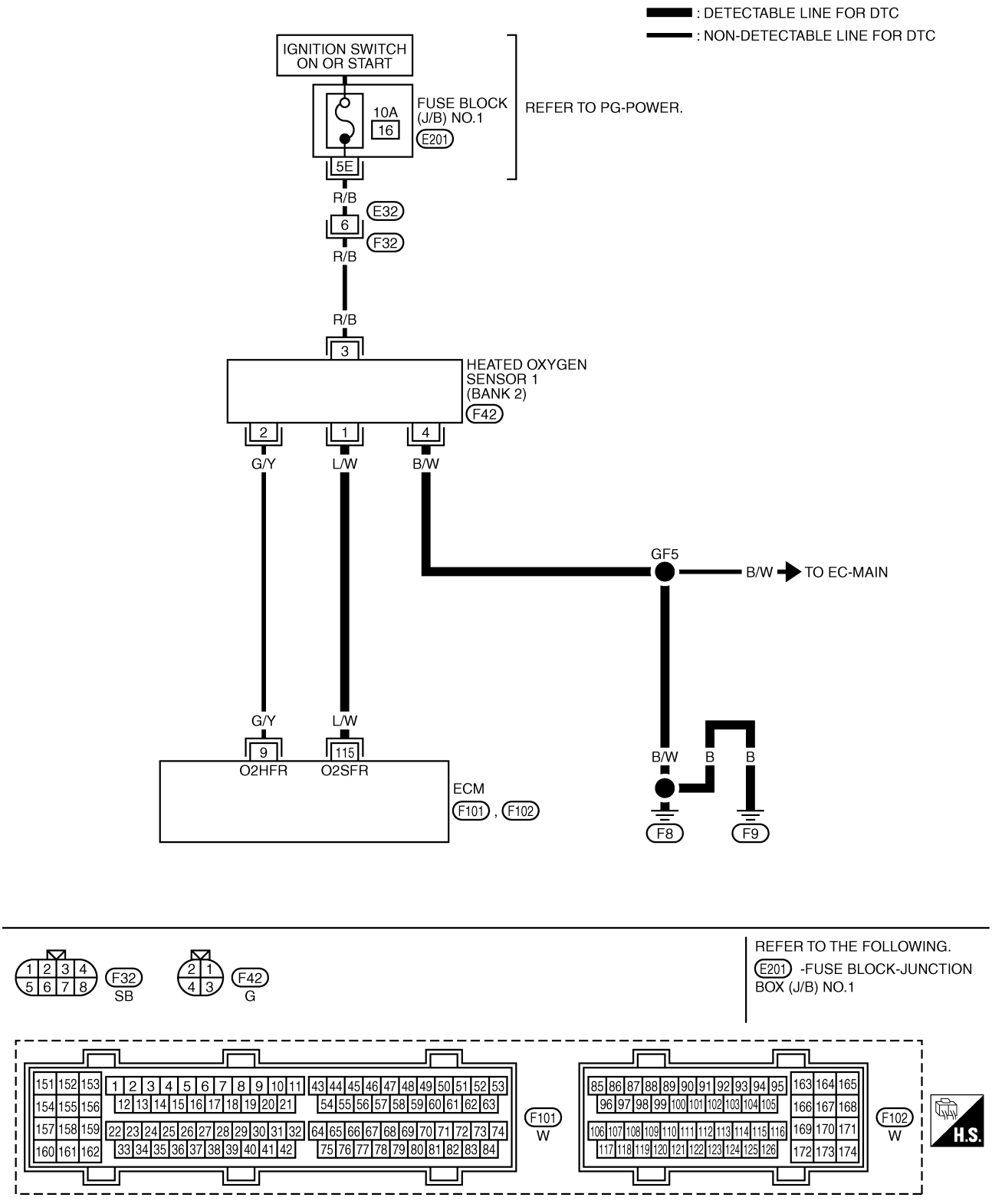
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	R/L	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

BANK 2

EC-O2S1B2-01



TBWM0108E

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

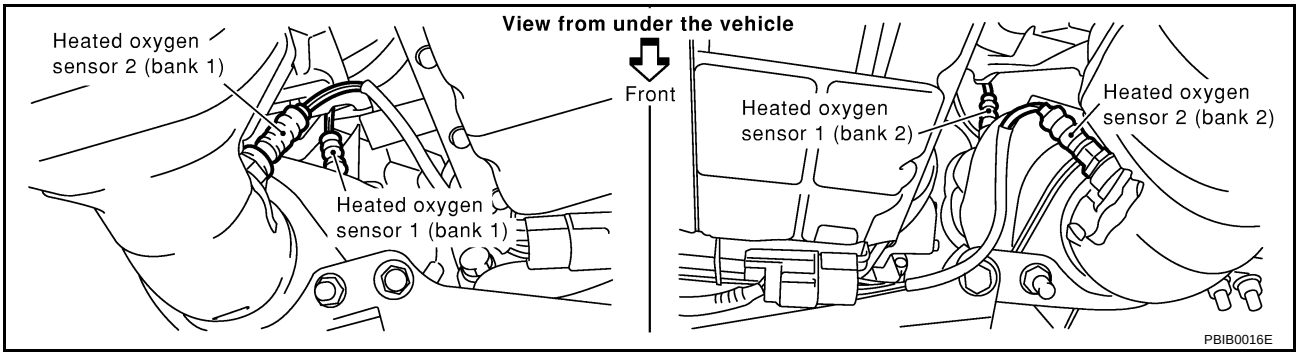
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

Diagnostic Procedure

EBS00D34

1. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

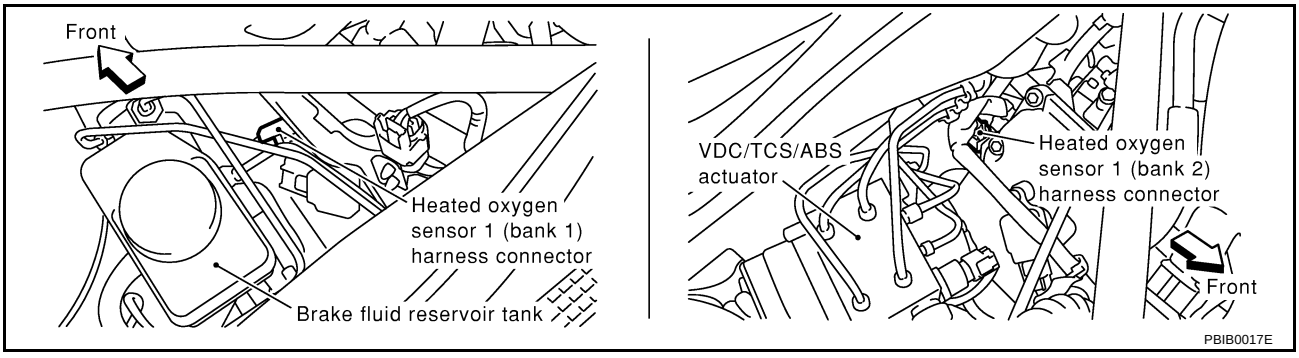


Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.



2. Check harness continuity between HO2S1 terminal 4 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit 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 and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	114	1	1
P0154	115	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0134	114 or 1	Ground	1
P0154	115 or 1	Ground	2

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-239, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002OZ

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)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

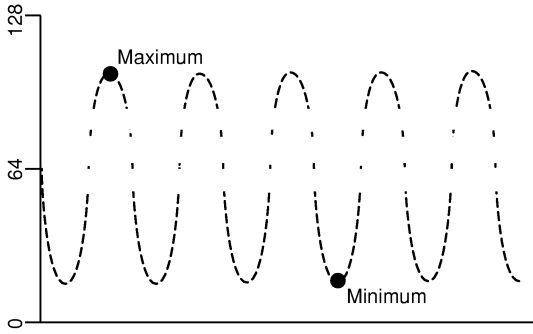
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

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



CAUTION:

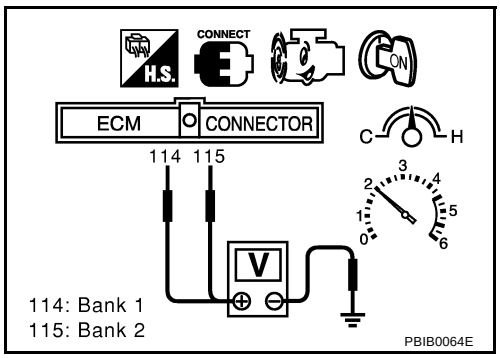
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 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 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002MD

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P0135 (BANK 1), P0155 (BANK 2) HO2S1 HEATER

PFP:22690

Description

EBS002HN

SYSTEM DESCRIPTION

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 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS002HO

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

EBS002HP

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range.
(An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater.)

Possible Cause

EBS002HQ

- Harness or connectors
  (The heated oxygen sensor 1 heater circuit is open or shorted.)
- Heated oxygen sensor 1 heater

DTC Confirmation Procedure

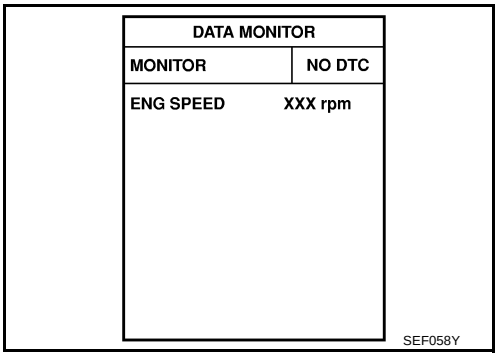
EBS002HR

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 run it for at least 6 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-246, "Diagnostic Procedure"
   .



WITH GST

1. Start engine and run it for at least 6 seconds at idle speed.
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.

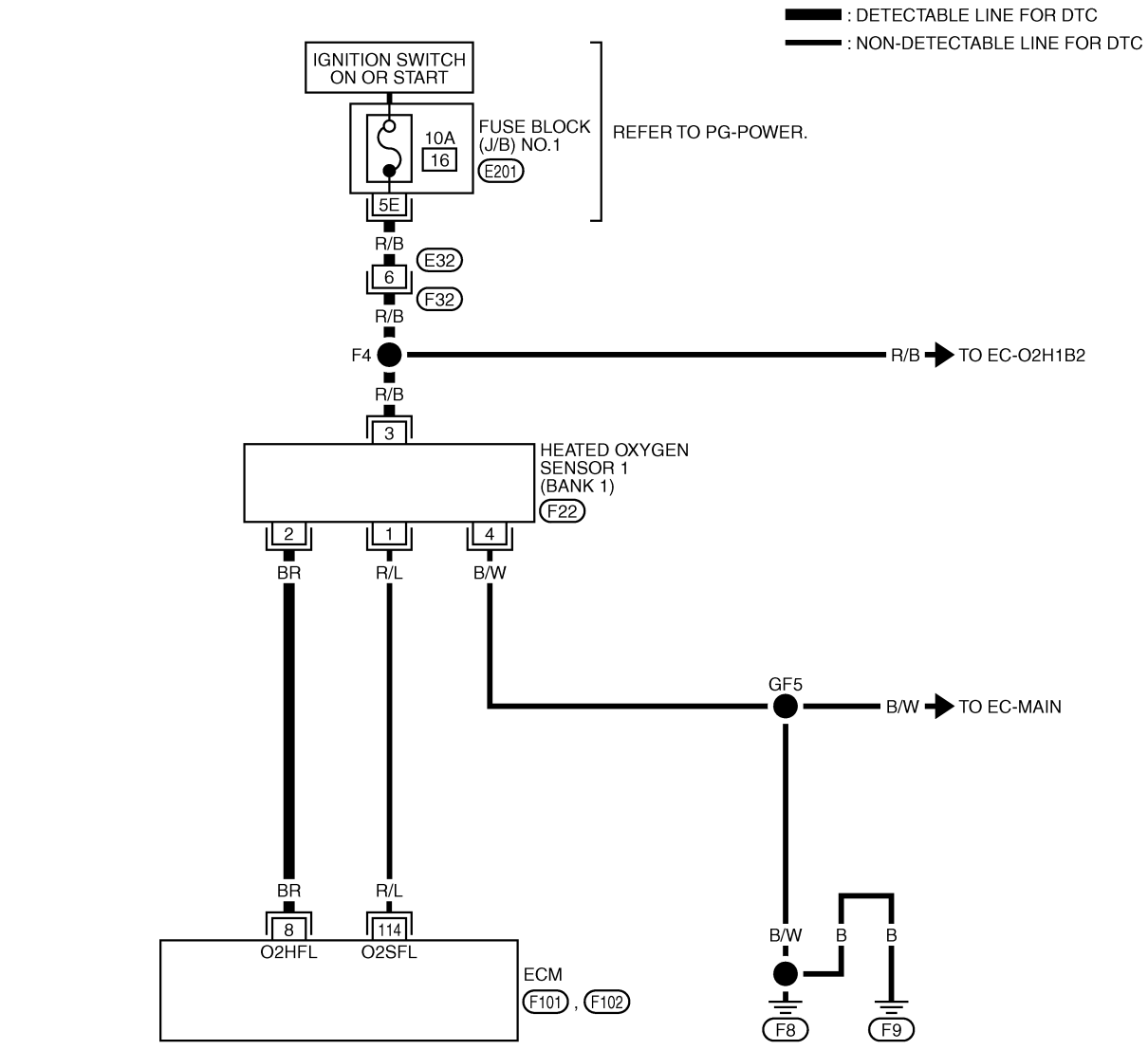
4. Select “MODE 3” with GST.
5. If DTC is detected, go to EC-246, "Diagnostic Procedure" .

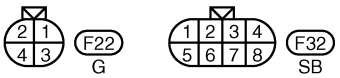
– **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram
BANK 1

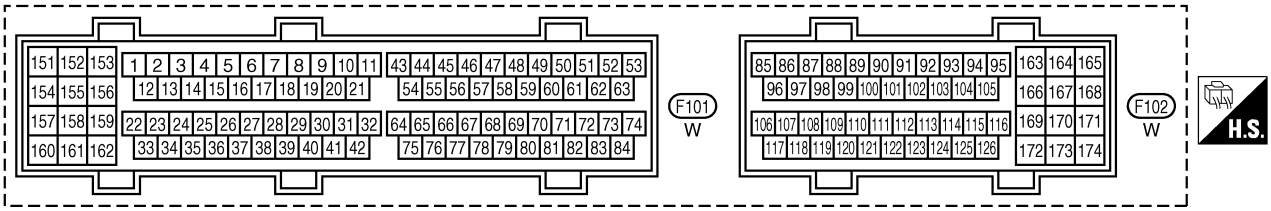
EBS002HS

EC-O2H1B1-01





REFER TO THE FOLLOWING.
E201 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1



TBWM0012E

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

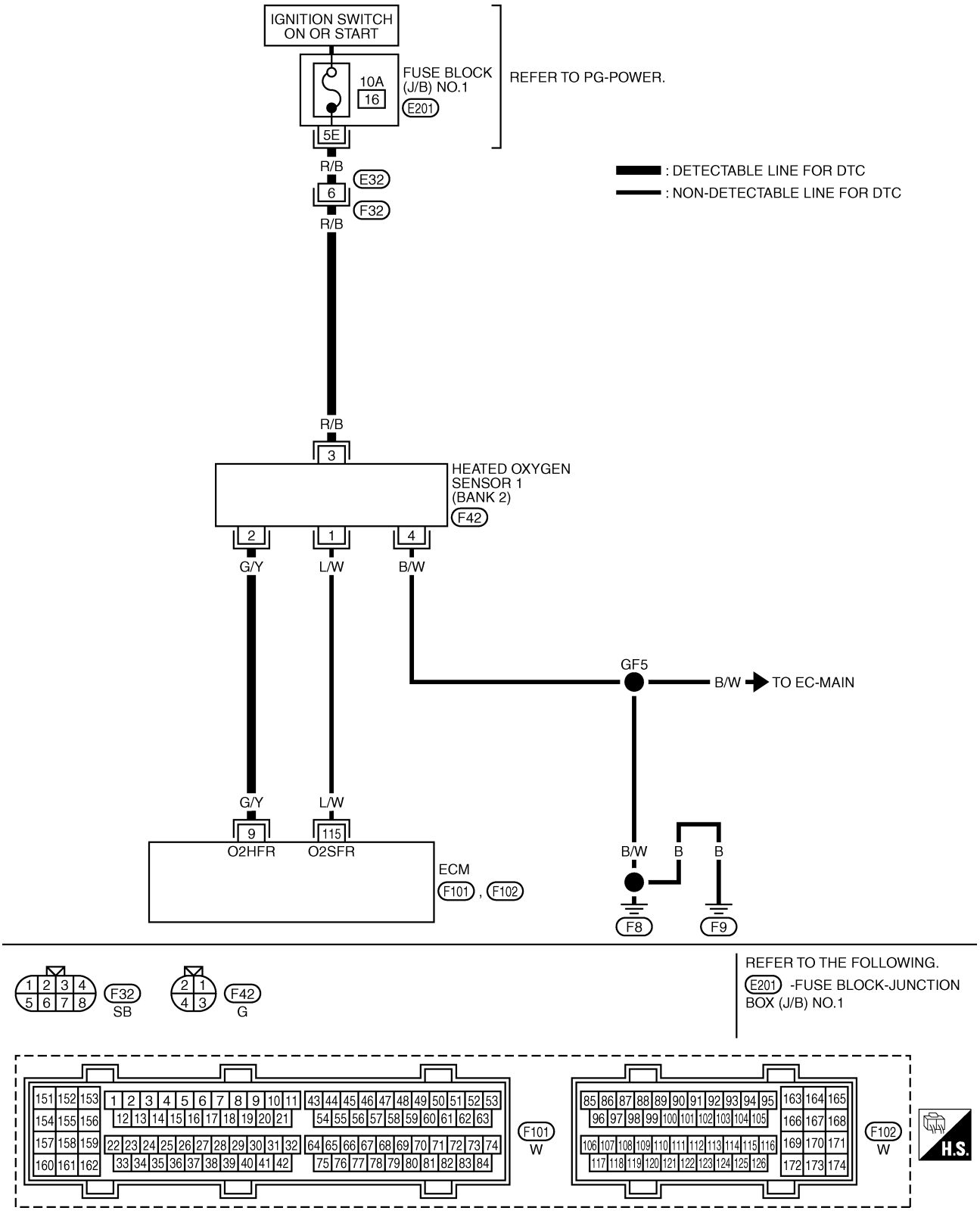
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8	BR	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H1B2-01



TBWM0013E

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

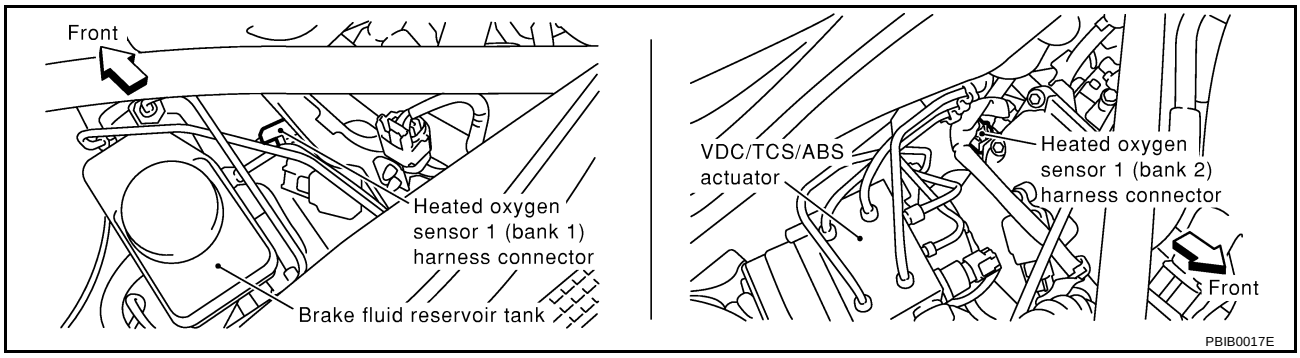
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	G/Y	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS002HT

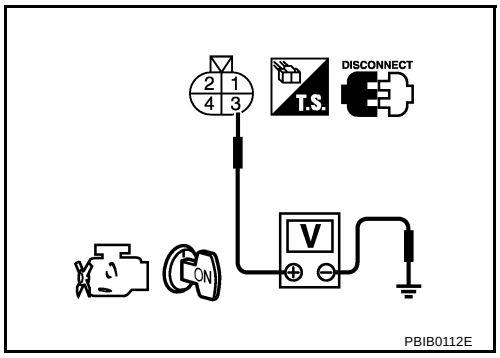
1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between HO2S1 terminal 3 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 E32, F32
- Fuse block (J/B) No. 1 connector E201
- 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 and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0135	8	2	1
P0155	9	2	2

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-247, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002HU

HEATED OXYGEN SENSOR 1 HEATER

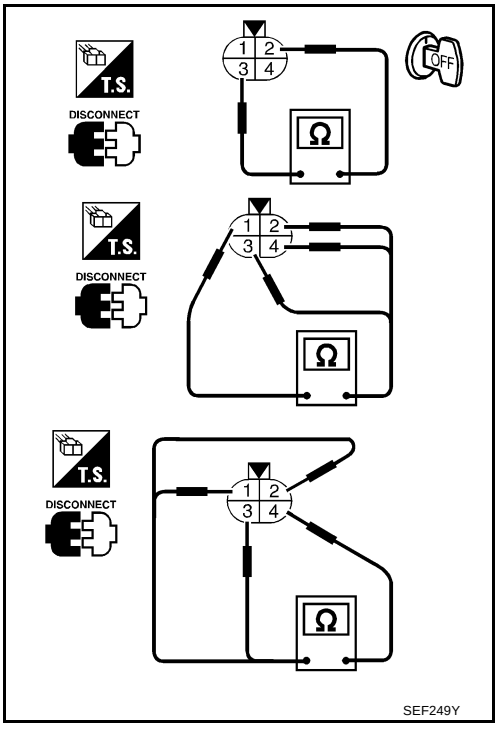
1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
2 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

EBS002HV

HEATED OXYGEN SENSOR 1

Refer to EM-22, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

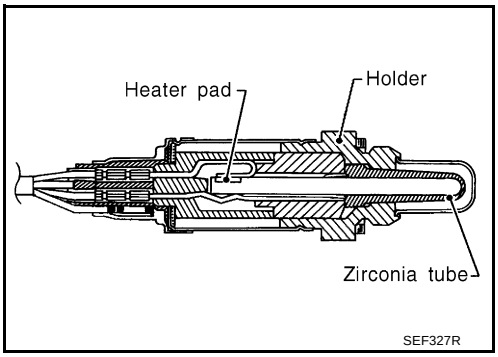
DTC P0137 (BANK 1), P0157 (BANK 2) HO2S2 (MIN. VOLTAGE MONITORING)

PFP:226A0

Component Description

EBS002HW

The heated oxygen sensor 2, after three way catalyst, 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

EBS002HX

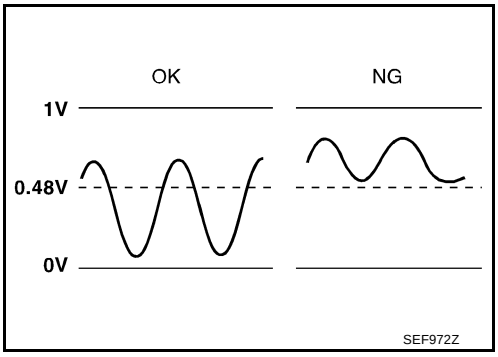
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS002HY

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.
Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.



Possible Cause

EBS002HZ

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors

DTC Confirmation Procedure

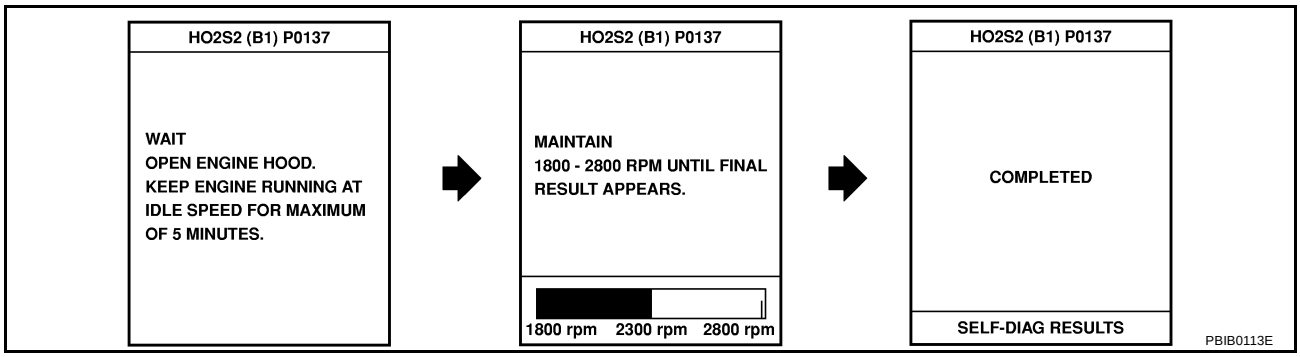
EBS002I0

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:
Open engine hood before conducting following procedure.

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. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).

6. Select “HO2S2 (B1) P0137” or “HO2S2 (B2) P0157” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-254, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

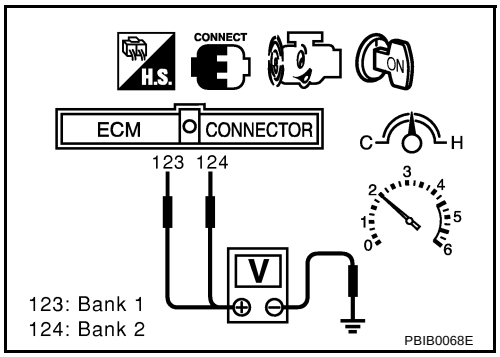
Overall Function Check

EBS002I1

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.

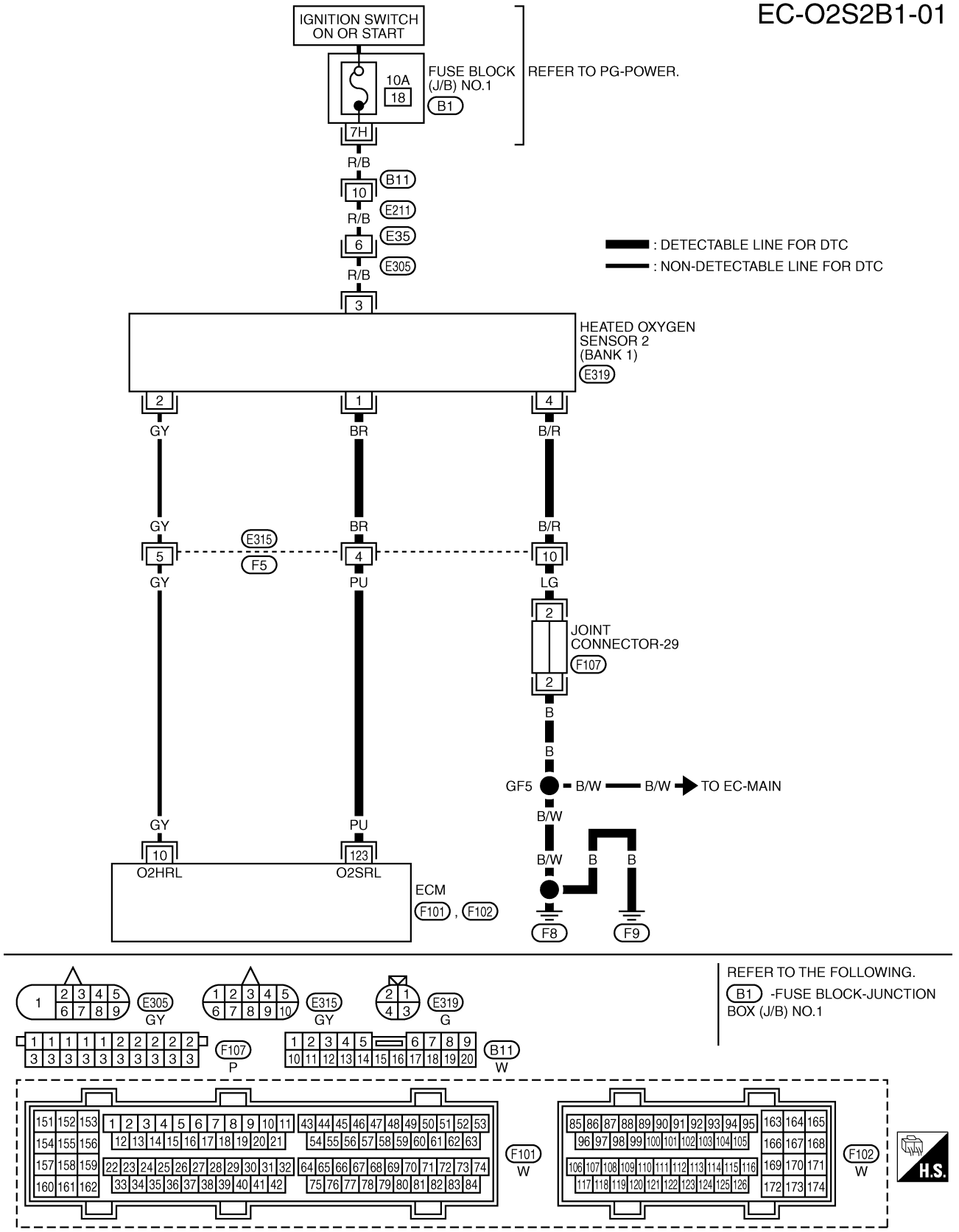


5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.48V at least once during this procedure.
6. If NG, go to EC-254, "Diagnostic Procedure" .

Wiring Diagram

EBS002I2

BANK 1



TBWM0014E

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

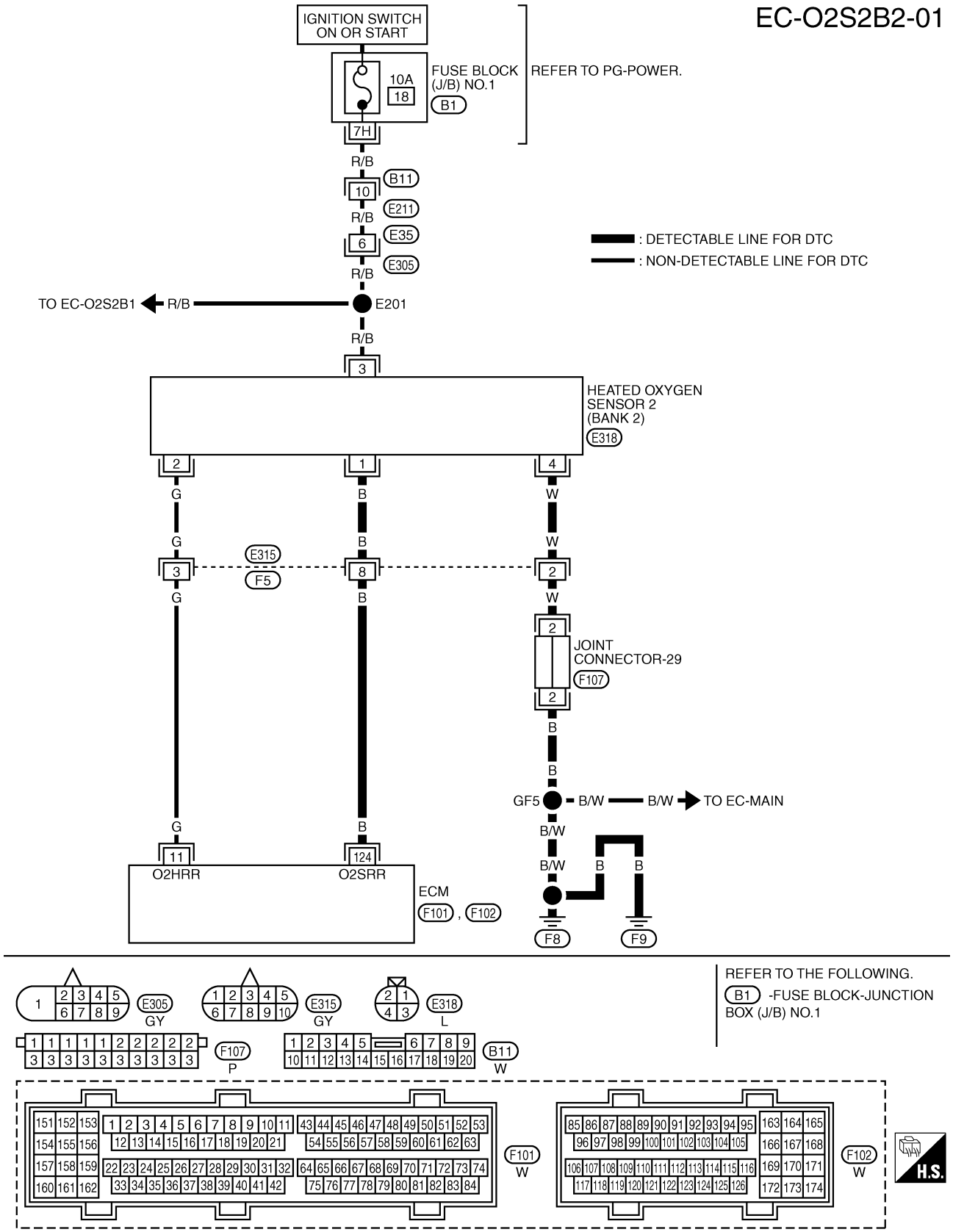
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	PU	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01



TBWM0015E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

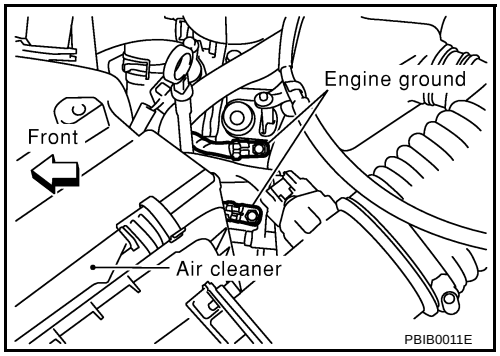
Diagnostic Procedure

EBS002I3

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

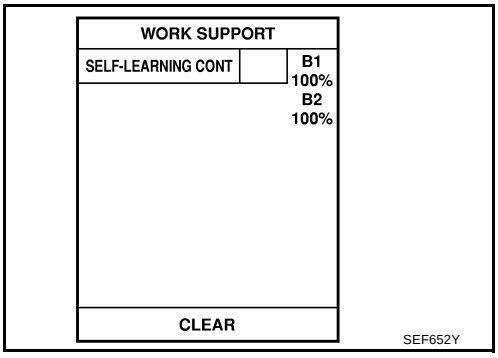
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

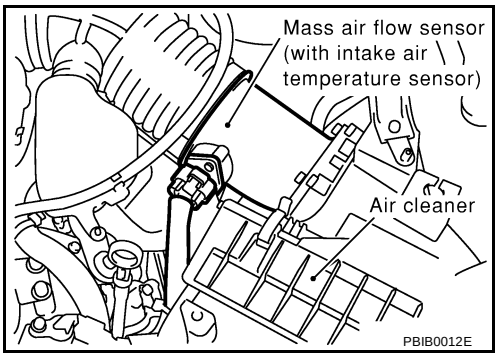
With CONSULT-II

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 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

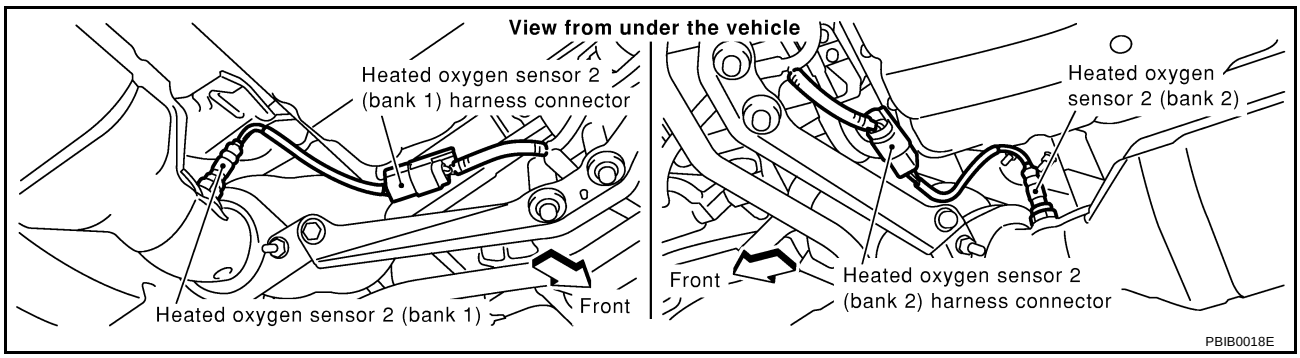


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-309 .
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. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Joint connector-29
- Harness for open or short between heated oxygen sensor 2 and ground

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

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	123	1	1
P0157	124	1	2

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	123	Ground	1
P0157	124	Ground	2

Continuity should not exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between heated oxygen sensor 2 and ECM

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-258, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002I4

HEATED OXYGEN SENSOR 2

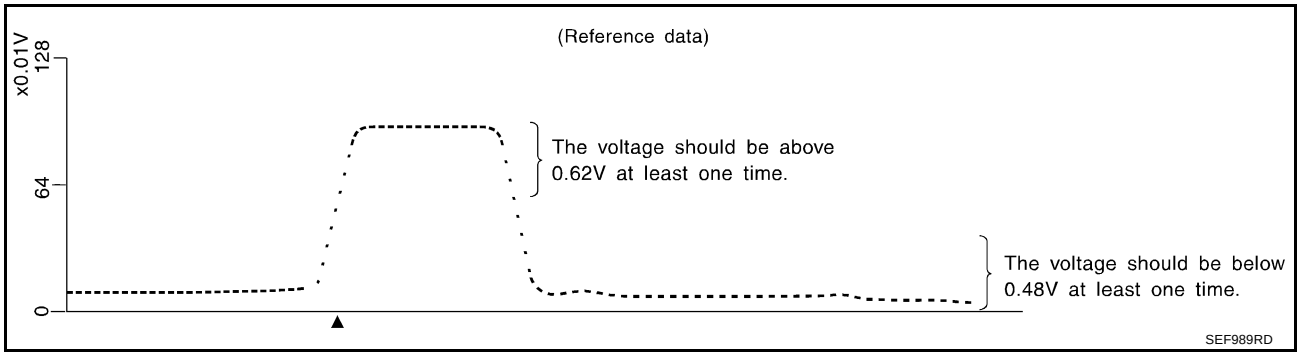
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” 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

4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



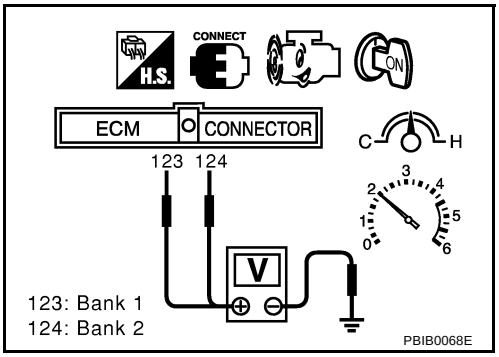
“HO2S2 (B1)/(B2)” should be above 0.62V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is –25%.

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.48V at least once during this procedure.
6. 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002I5

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

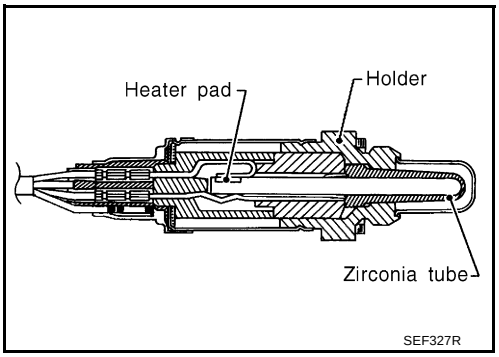
DTC P0138 (BANK 1), P0158 (BANK 2) HO2S2 (MAX. VOLTAGE MONITORING)

PFP:226A0

Component Description

EBS002QT

The heated oxygen sensor 2, after three way catalyst, 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

EBS002QU

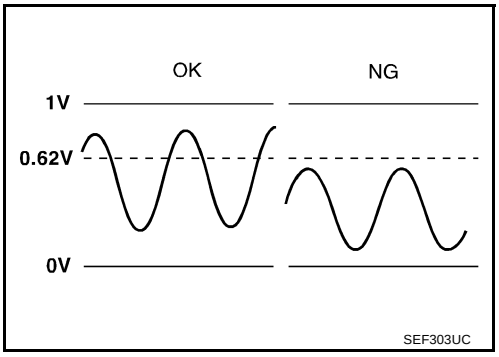
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS002I8

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.
Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.



Possible Cause

EBS002I9

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

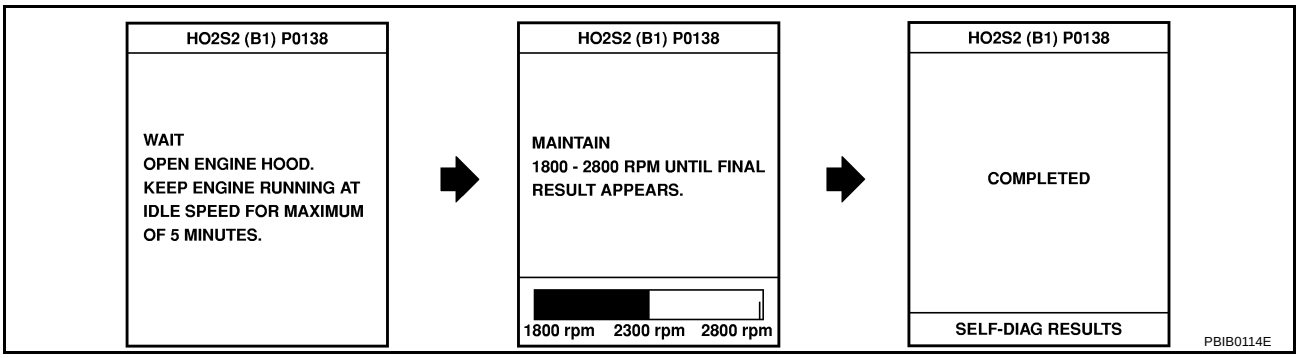
EBS002IA

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:
Open engine hood before conducting following procedure.

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. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P0138” or “HO2S2 (B2) P0158” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-265, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

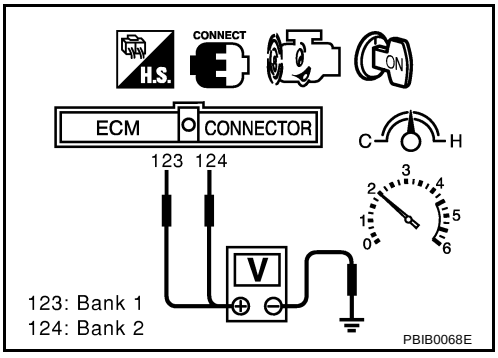
Overall Function Check

EBS002QV

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

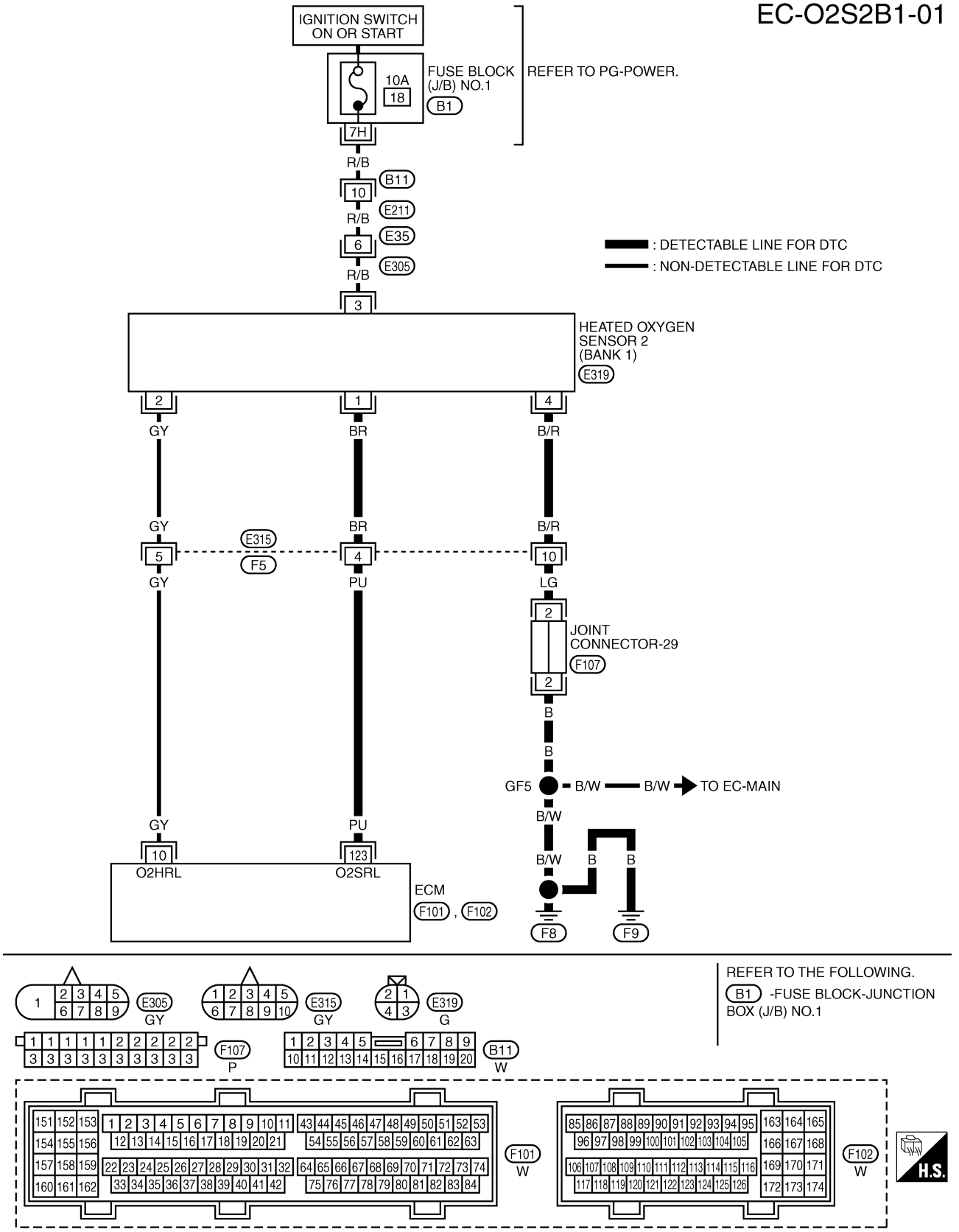
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be above 0.62V at least once during this procedure.
6. If NG, go to EC-265, "Diagnostic Procedure" .



Wiring Diagram

EBS002QW

BANK 1



TBWM0014E

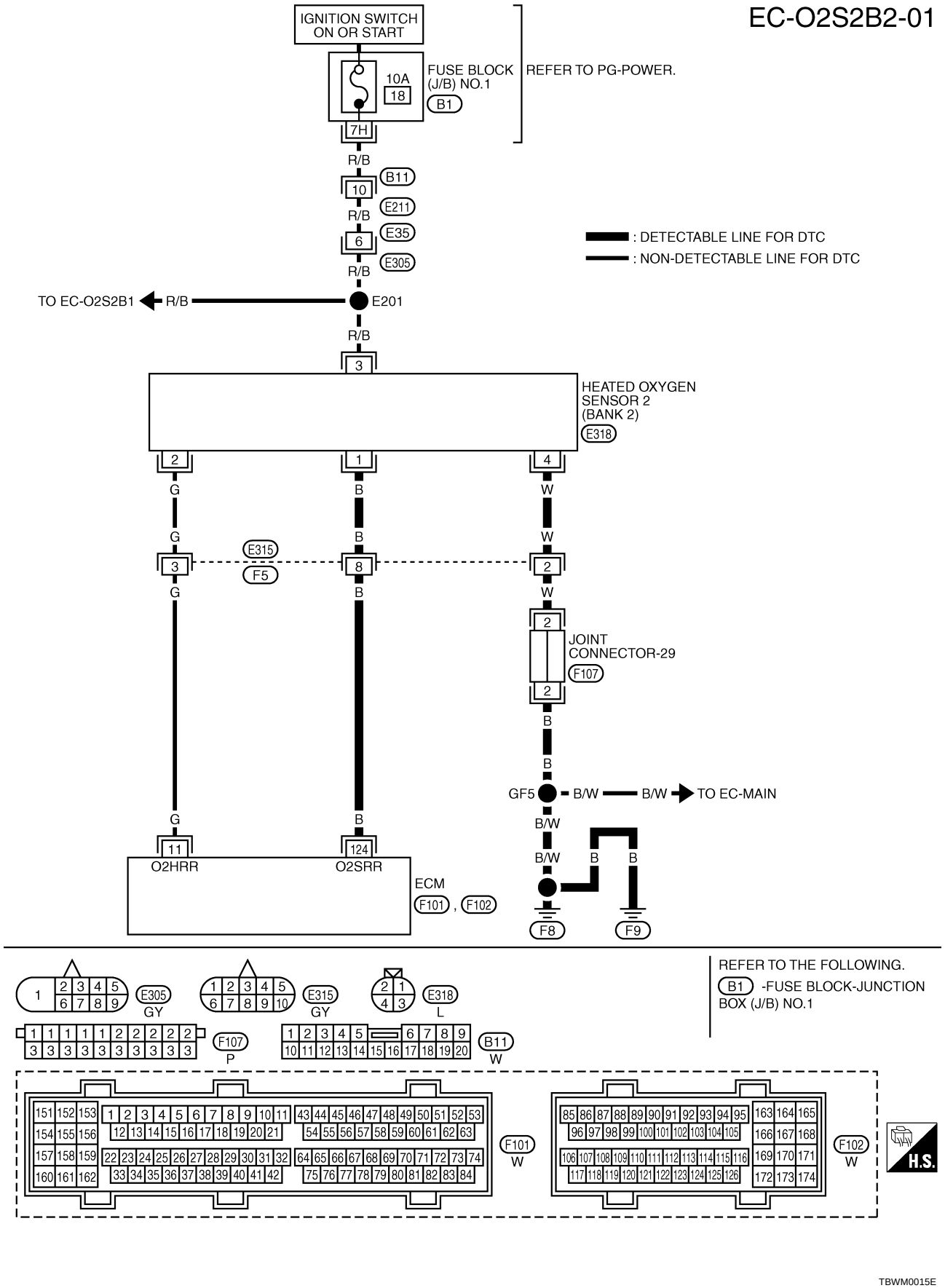
Specification data are reference values and are measured between each terminal and body ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	PU	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

BANK 2



TBWM0015E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

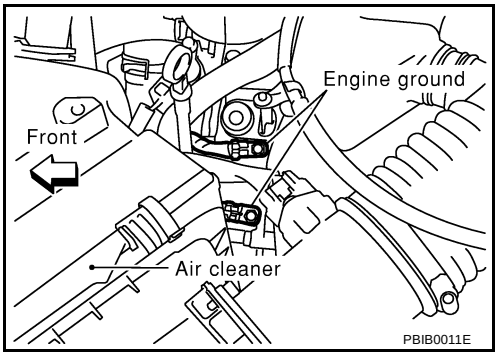
Diagnostic Procedure

EBS003FY

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

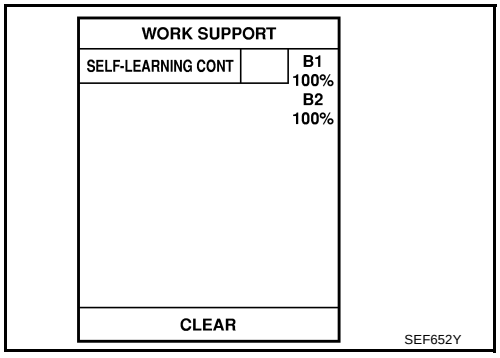
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

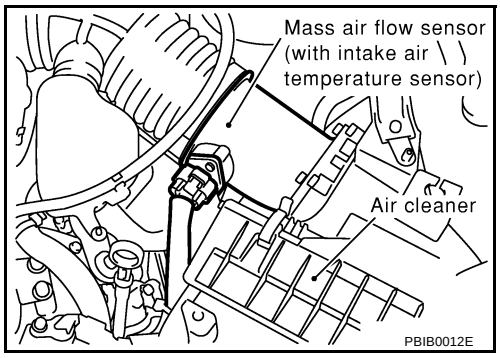
With CONSULT-II

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 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

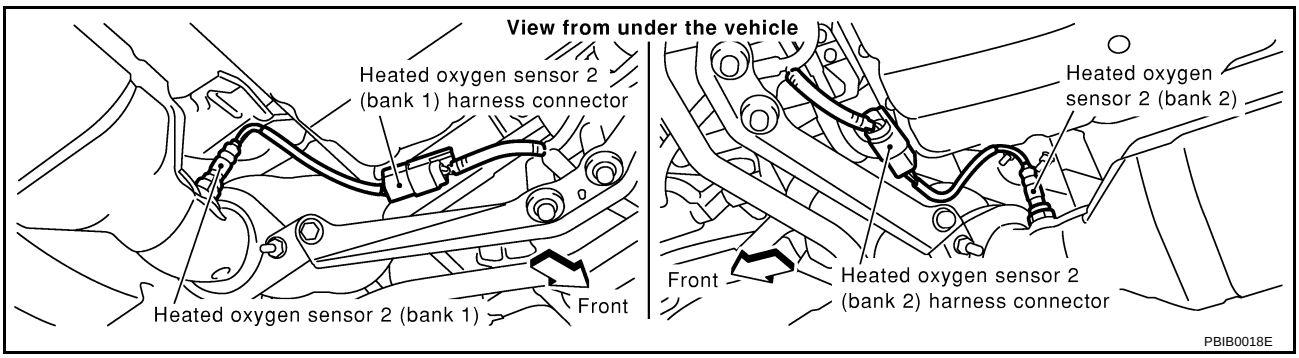


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-309 .
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. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Joint connector-29
- Harness for open or short between heated oxygen sensor 2 and ground

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

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	123	1	1
P0157	124	1	2

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	123	Ground	1
P0157	124	Ground	2

Continuity should not exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between heated oxygen sensor 2 and ECM

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-269, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002QX

HEATED OXYGEN SENSOR 2

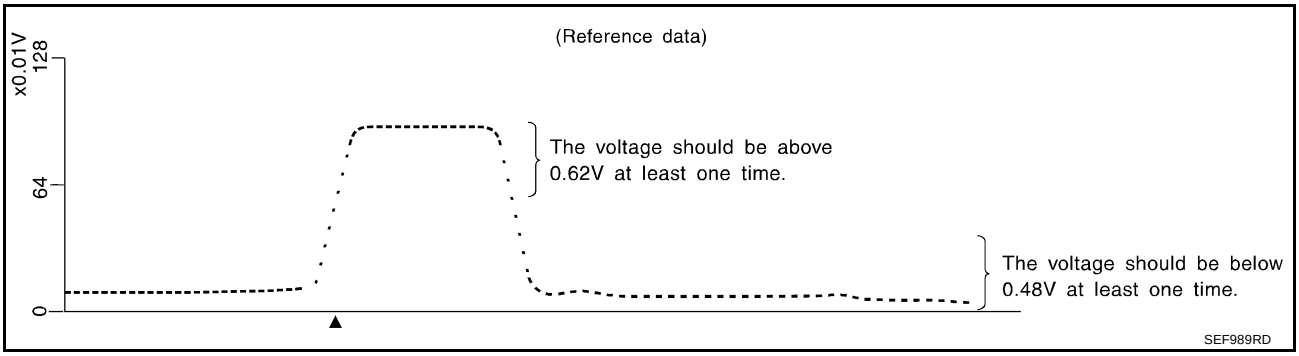
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” 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

4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



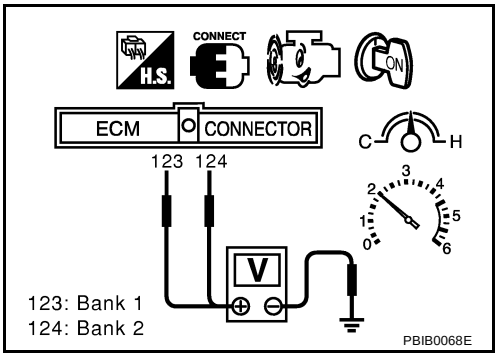
“HO2S2 (B1)/(B2)” should be above 0.62V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is −25%.

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.48V at least once during this procedure.
6. 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002QY

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

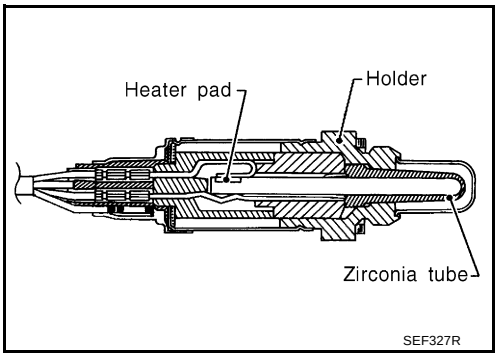
DTC P0139 (BANK 1), P0159 (BANK 2) HO2S2 (RESPONSE MONITORING)

PFP:226A0

Component Description

EBS002QZ

The heated oxygen sensor 2, after three way catalyst, 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

EBS002R0

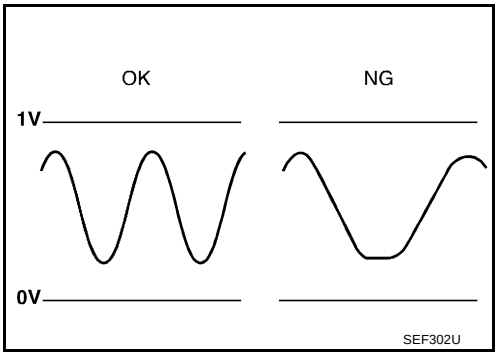
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS002II

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 switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.
Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.



Possible Cause

EBS002IJ

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

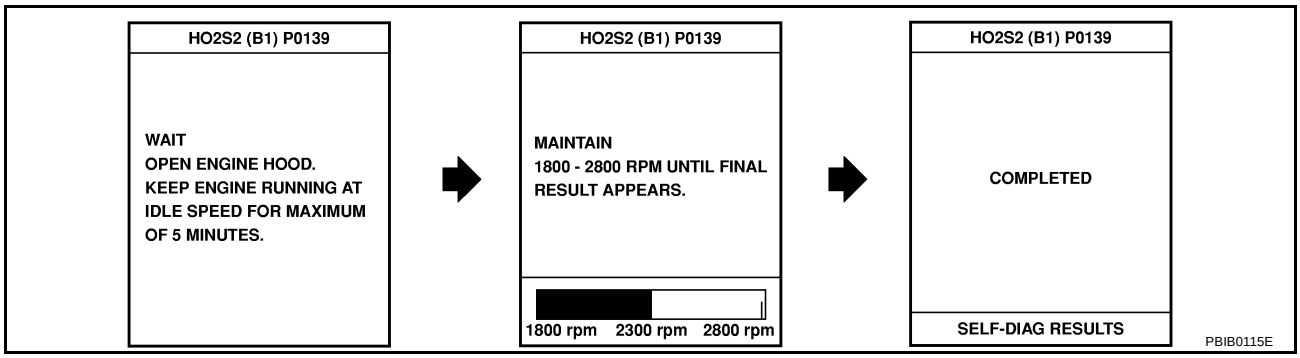
EBS002IK

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:
Open engine hood before conducting following procedure.

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. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6. Select “HO2S2 (B1) P0139” or "HO2S2 (B2) P0159" of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Start engine and follow the instruction of CONSULT-II.



8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to EC-276, "Diagnostic Procedure" .
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a. Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b. Turn ignition switch “ON”.
c. Select “DATA MONITOR” mode with CONSULT-II.
d. Start engine.
e. Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

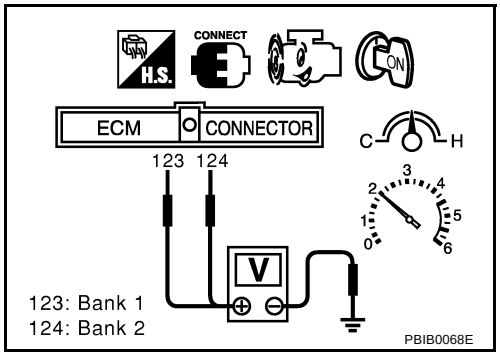
Overall Function Check

EBS002R1

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 4, step 5 is not necessary.

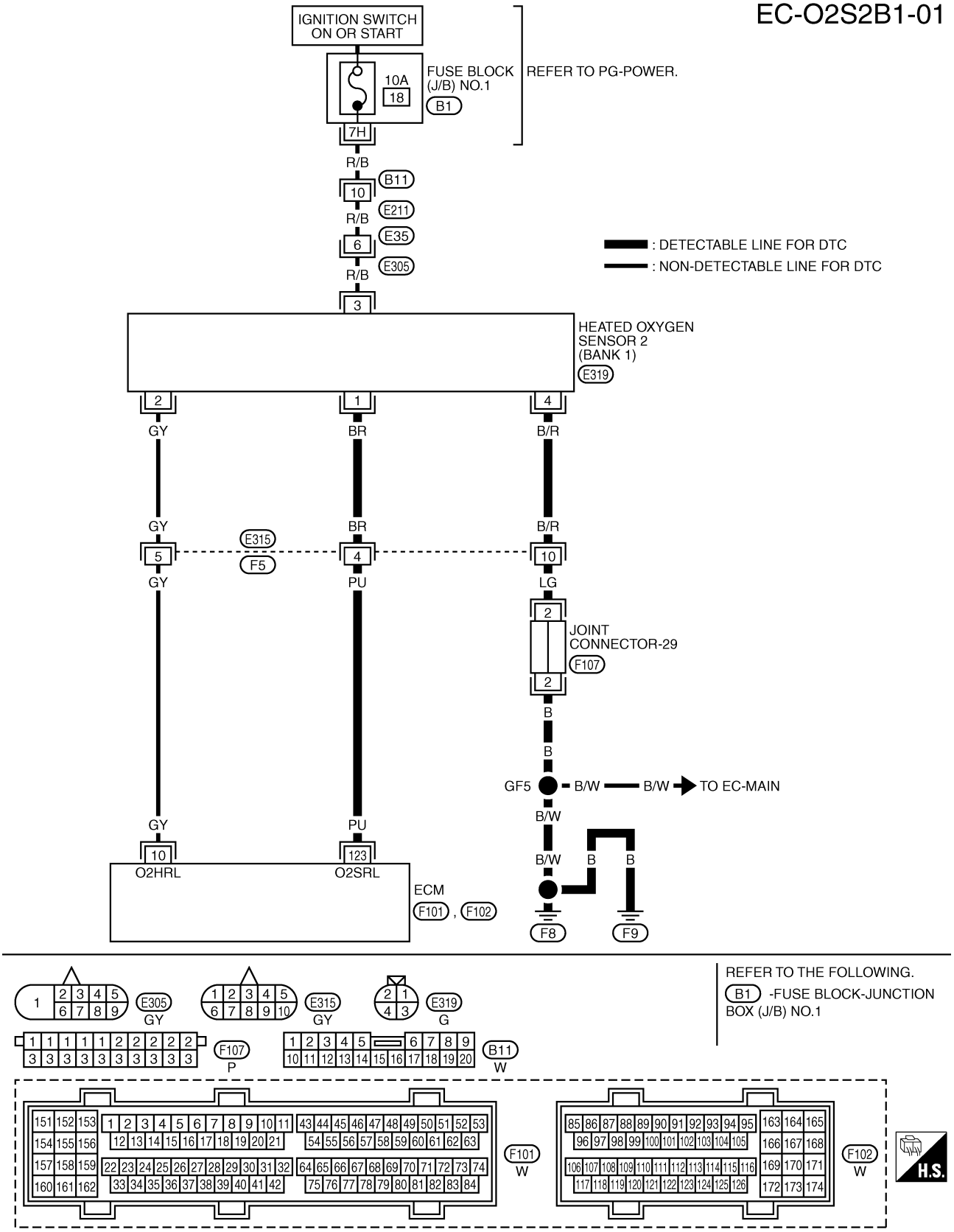


5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6. If NG, go to EC-276, "Diagnostic Procedure" .

Wiring Diagram

EBS002R2

BANK 1



TBWM0014E

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

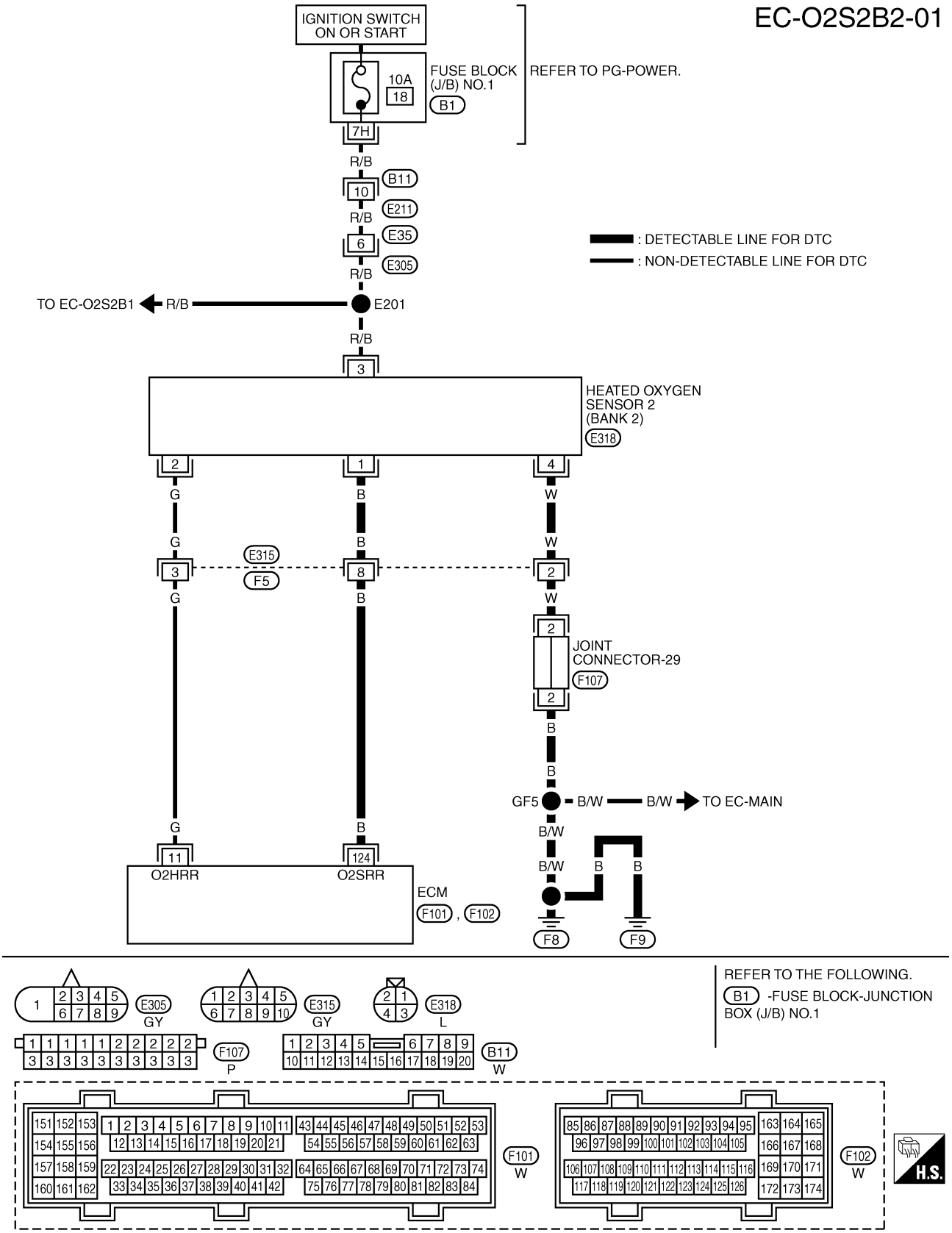
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	PU	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01



TBWM0015E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

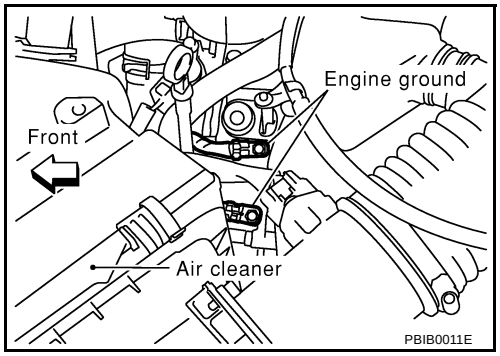
Diagnostic Procedure

EBS003FZ

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

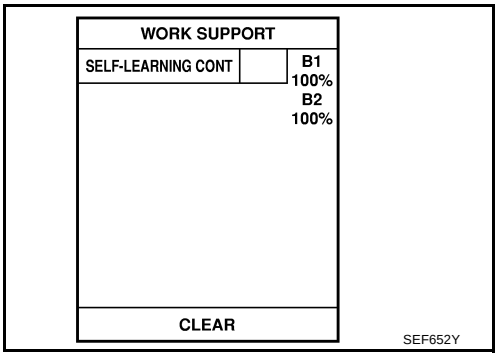
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

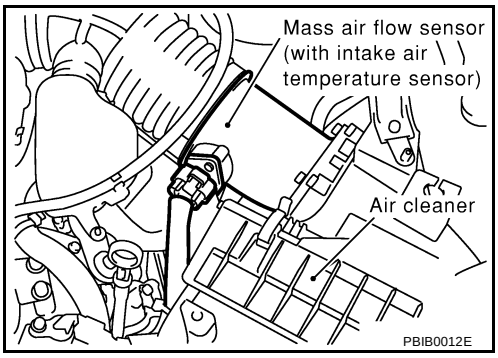
With CONSULT-II

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 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

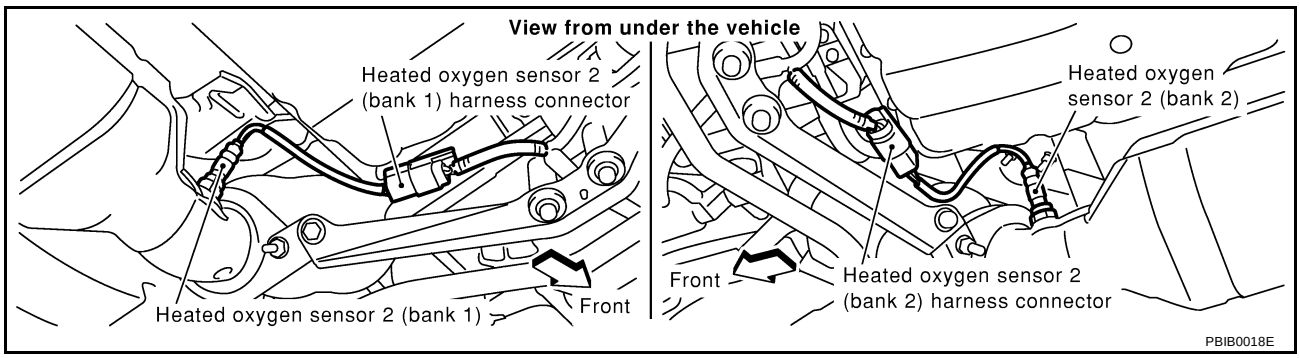


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-309 .
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. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Joint connector-29
- Harness for open or short between heated oxygen sensor 2 and ground

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

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	123	1	1
P0157	124	1	2

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	123	Ground	1
P0157	124	Ground	2

Continuity should not exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between heated oxygen sensor 2 and ECM

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-280, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002IO

HEATED OXYGEN SENSOR 2

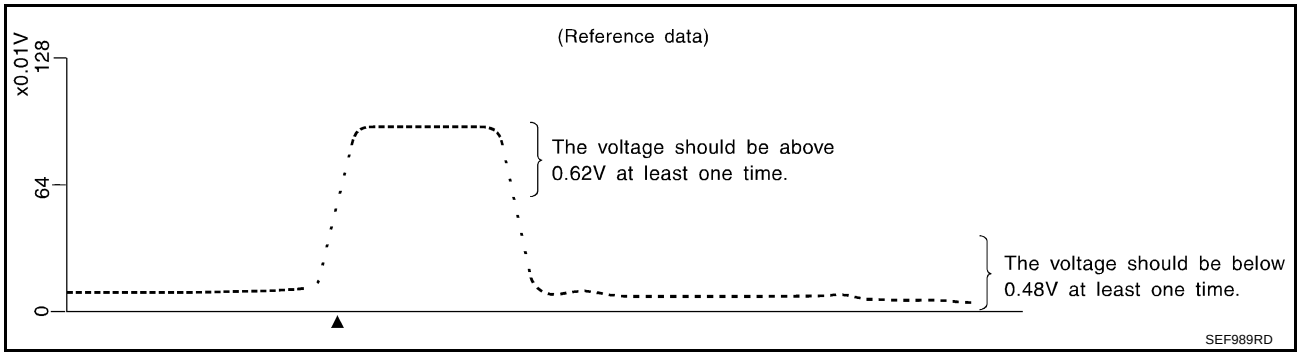
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” 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

4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



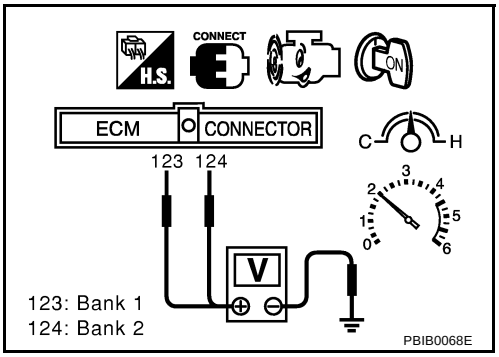
“HO2S2 (B1)/(B2)” should be above 0.62V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is –25%.

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.48V at least once during this procedure.
6. 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002IP

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

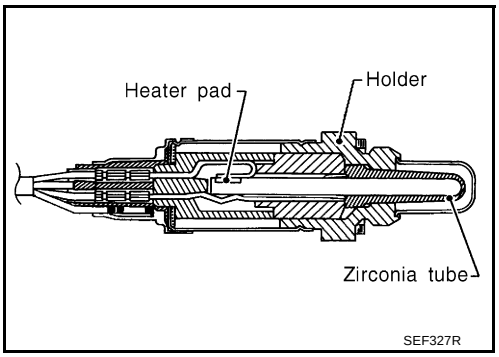
DTC P0140 (BANK 1), P0160 (BANK 2) HO2S2 (HIGH VOLTAGE)

PFP:226A0

Component Description

EBS002R4

The heated oxygen sensor 2, after three way catalyst, 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

EBS002R5

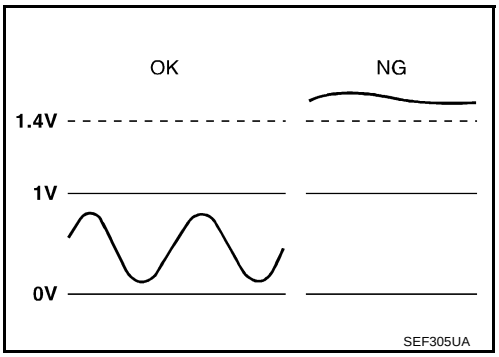
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS002IS

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 voltage is unusually high during the various driving condition such as fuel-cut.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.



Possible Cause

EBS002IT

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2

DTC Confirmation Procedure

EBS002IU

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.

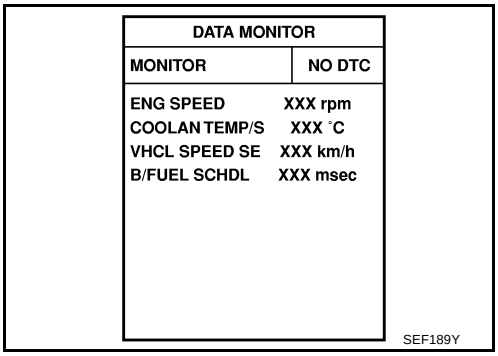
WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Let engine idle for 1 minute.

5. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,000 - 4,000 rpm
VHCL SPEED SE	More than 70 km/h (43 MPH)
B/FUEL SCHDL	1.6 - 12.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

6. If 1st trip DTC is detected, go to EC-287, "Diagnostic Procedure" .



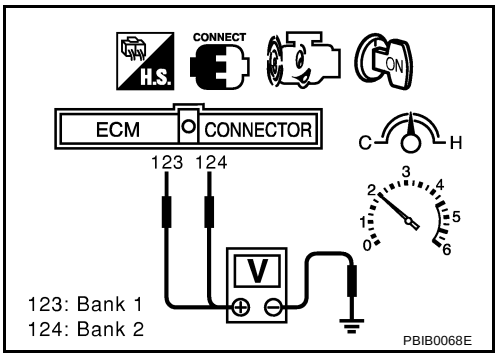
Overall Function Check

EBS002IV

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

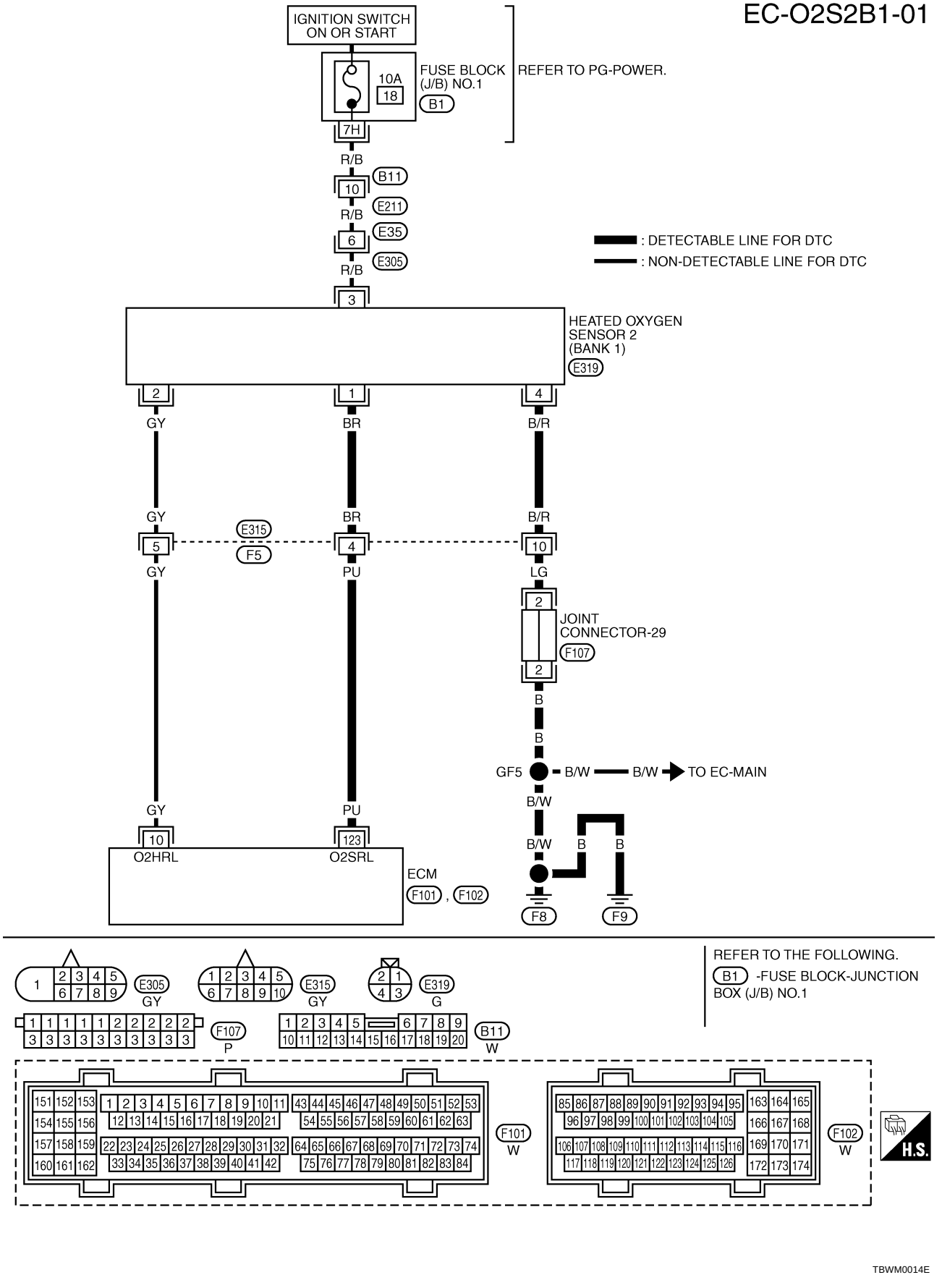
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 1.4V during this procedure.
5. If NG, go to EC-287, "Diagnostic Procedure" .



Wiring Diagram

EBS002R6

BANK 1



TBWM0014E

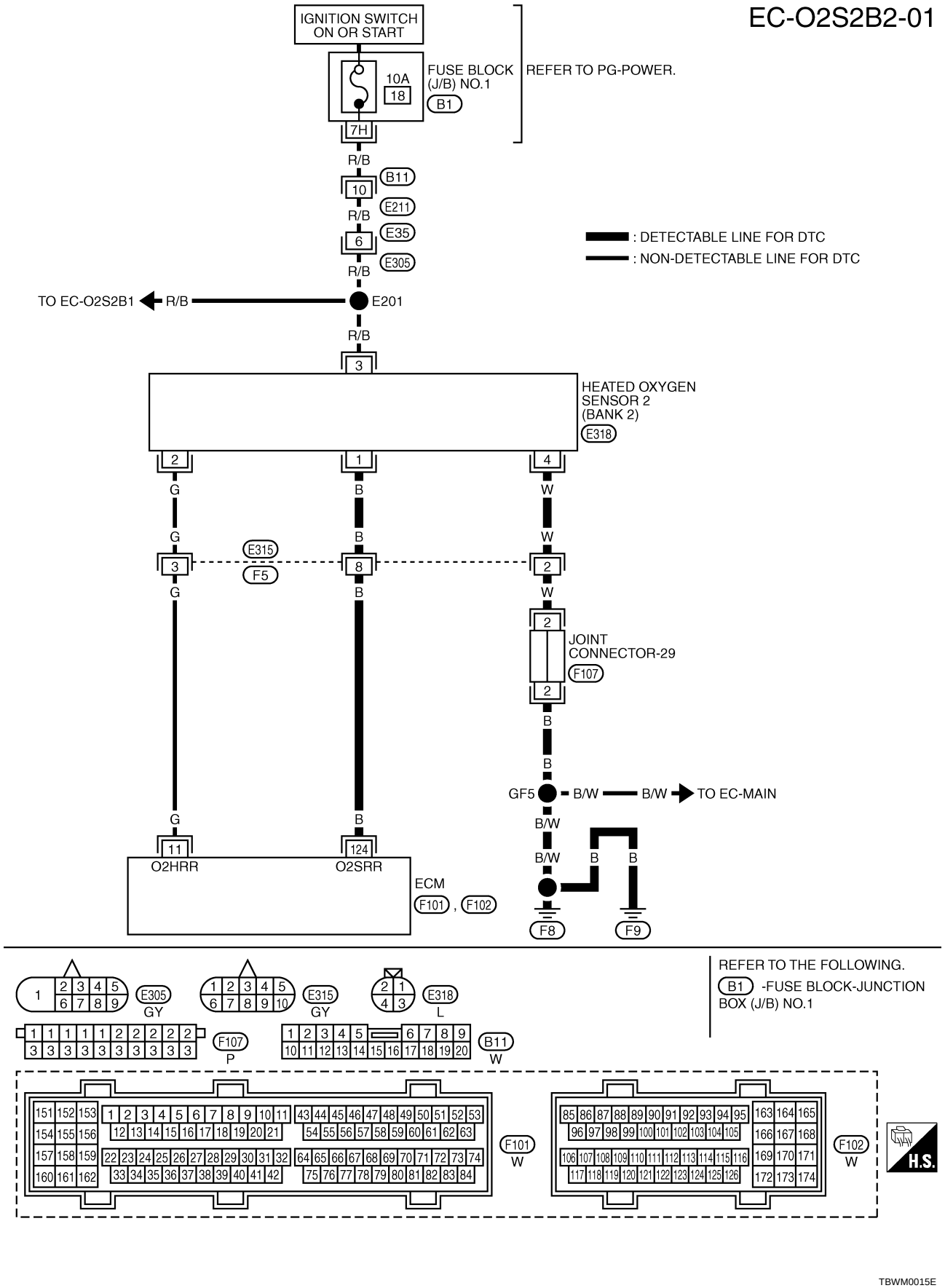
Specification data are reference values and are measured between each terminal and body ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	PU	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

BANK 2



TBWM0015E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V

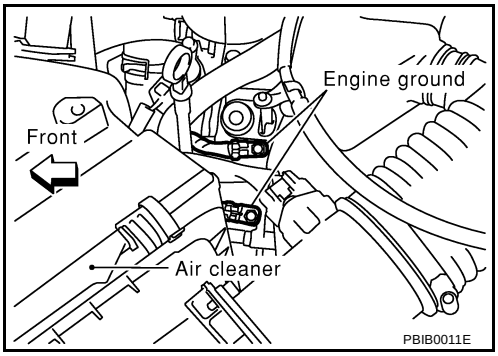
Diagnostic Procedure

EBS003G0

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

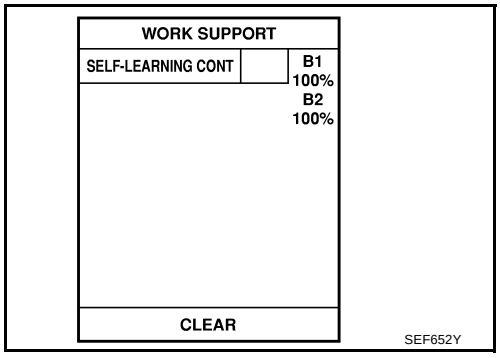
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

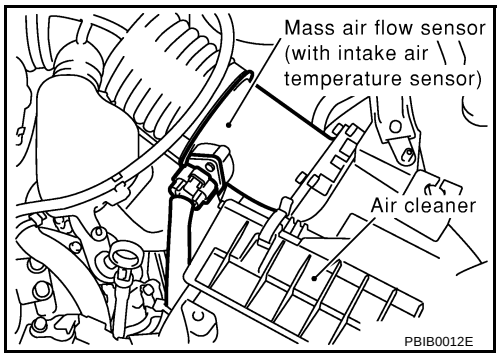
With CONSULT-II

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 or P0175 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 mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to EC-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

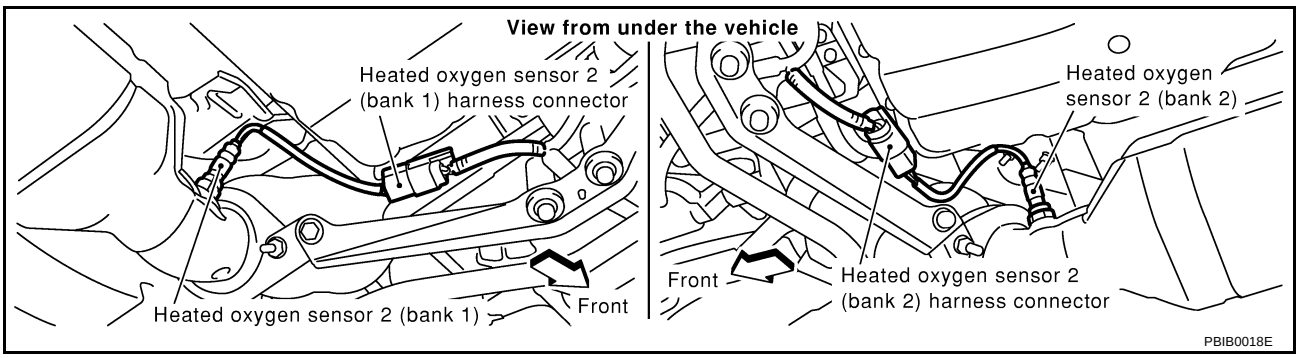


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-309 .
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. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Joint connector-29
- Harness for open or short between heated oxygen sensor 2 and ground

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

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	123	1	1
P0157	124	1	2

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	123	Ground	1
P0157	124	Ground	2

Continuity should not exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between heated oxygen sensor 2 and ECM

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-291, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002IY

HEATED OXYGEN SENSOR 2

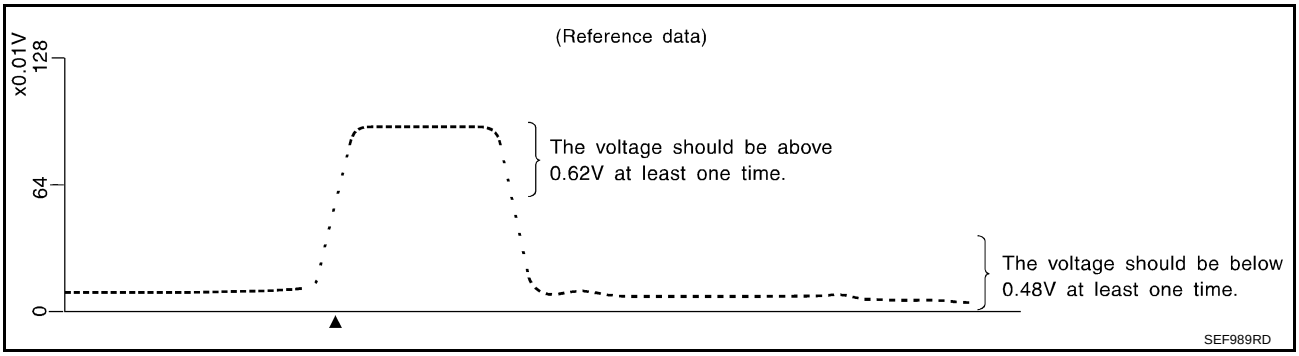
With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” 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

4. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



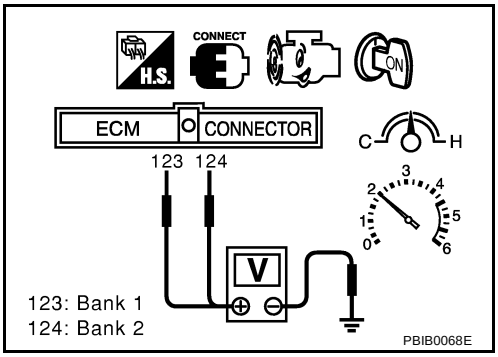
“HO2S2 (B1)/(B2)” should be above 0.62V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is −25%.

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 123 [HO2S2 (B1) signal] or 124 [HO2S2 (B2) signal] and engine ground.
4. 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 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 4, step 5 is not necessary.
5. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.48V at least once during this procedure.
6. 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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002IZ

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0141 (BANK 1), P0161 (BANK 2) HO2S2 HEATER

PFP:226A0

Description

EBS002J0

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heaters
Crankshaft position sensor (POS)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heaters
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS002J1

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,600 rpm.	OFF
	● Engine is running below 3,600 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	ON

On Board Diagnosis Logic

EBS002J2

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range.
(An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater.)

Possible Cause

EBS002J3

- Harness or connectors
  (The heated oxygen sensor 2 heater circuit is open or shorted.)
- Heated oxygen sensor 2 heater

DTC Confirmation Procedure

EBS002J4

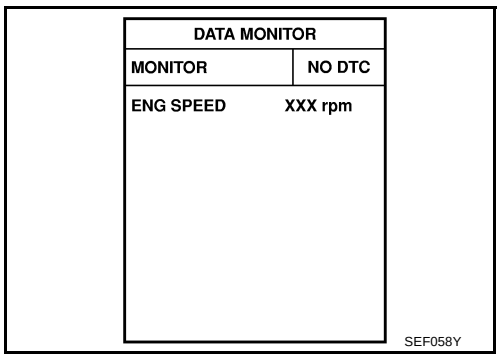
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 11V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine.
3. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.

4. Stop vehicle and let engine idle for at least 6 seconds.
5. If 1st trip DTC is detected, go to EC-298, "Diagnostic Procedure" .



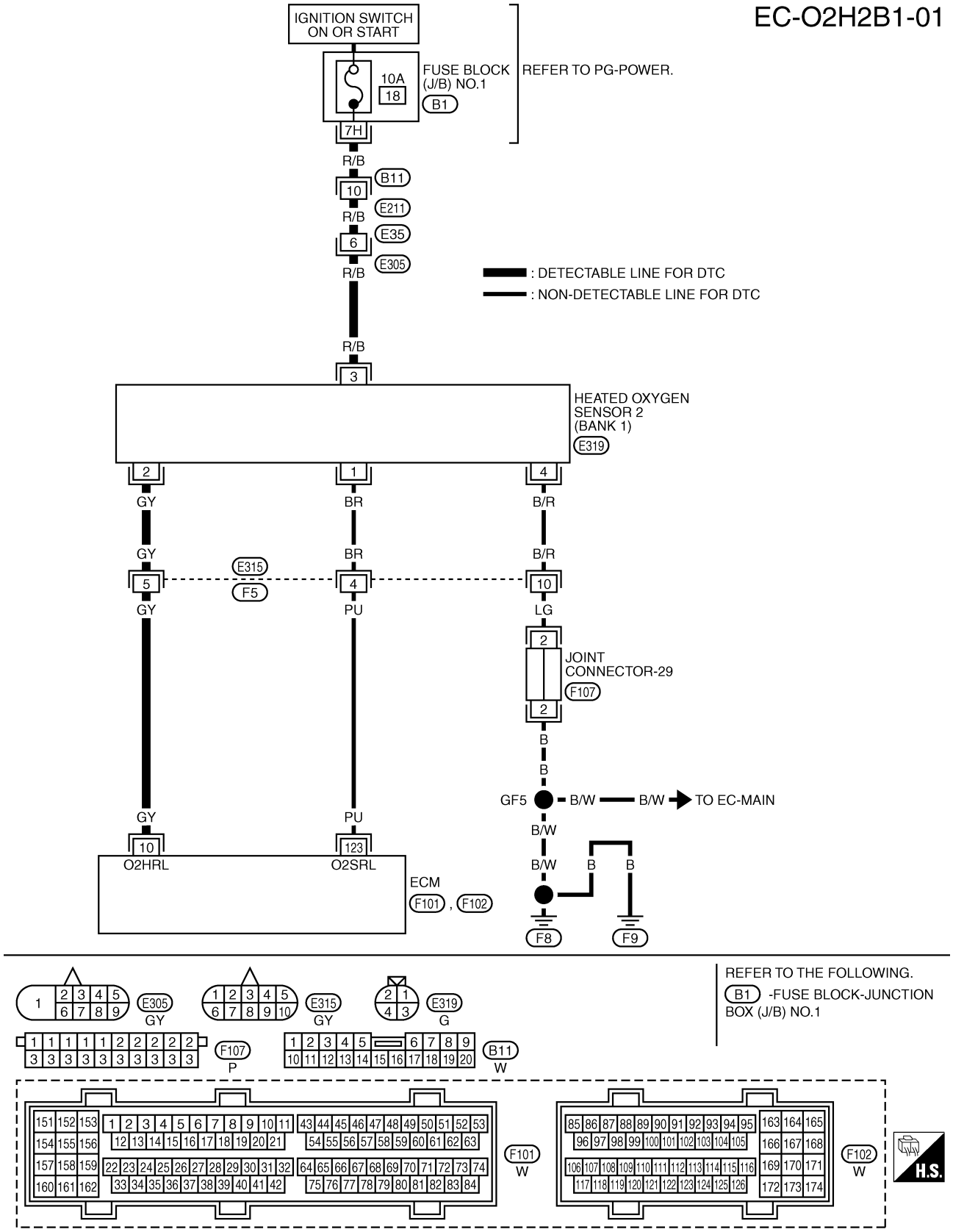
WITH GST

1. Start engine.
2. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle and let engine idle for at least 6 seconds.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine.
6. Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
7. Stop vehicle and let engine idle for at least 6 seconds.
8. Select “MODE 3” with GST.
9. If DTC is detected, go to EC-298, "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
BANK 1

EBS002J5



TBWM0016E

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

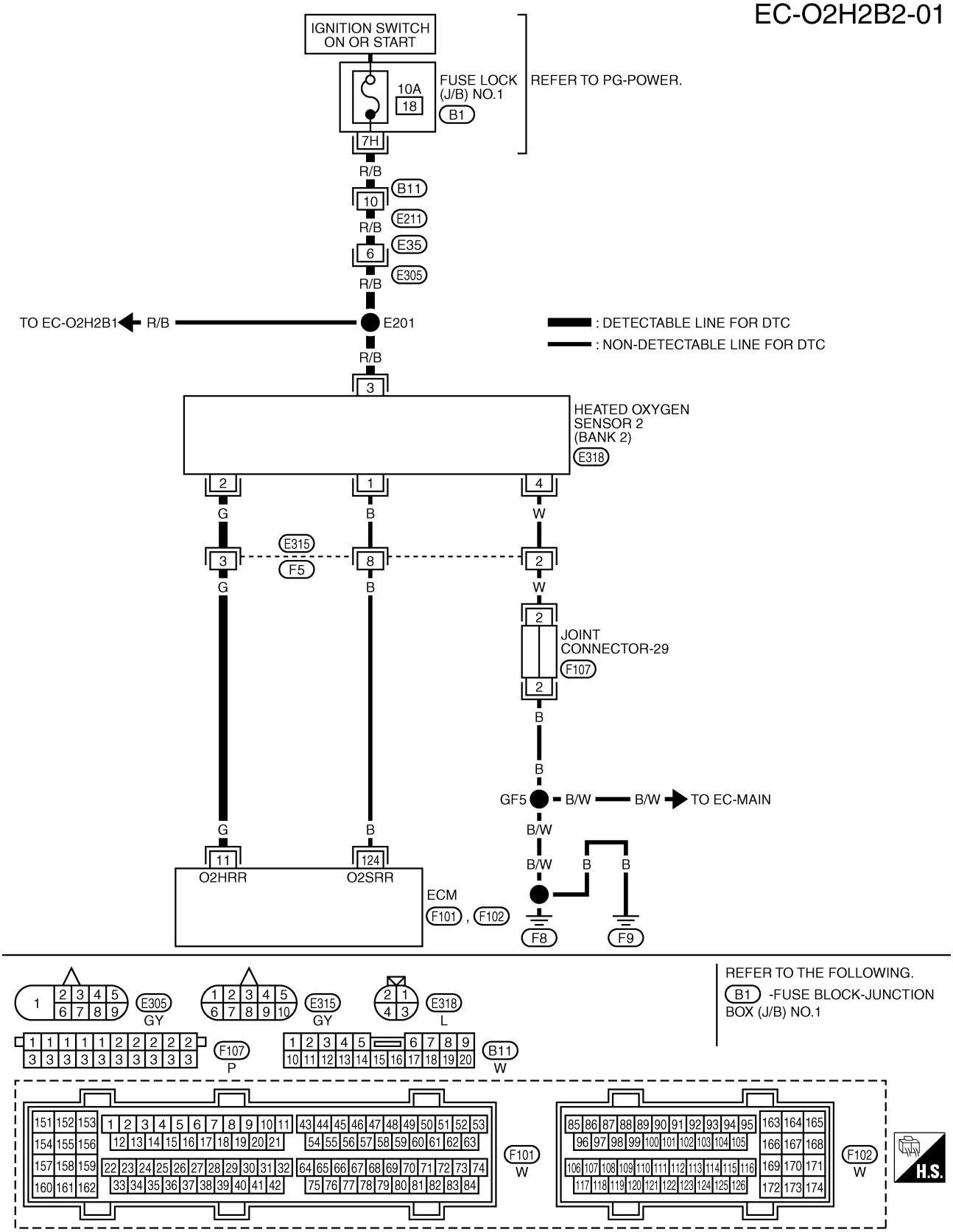
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	GY	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H2B2-01



TBWM0017E

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

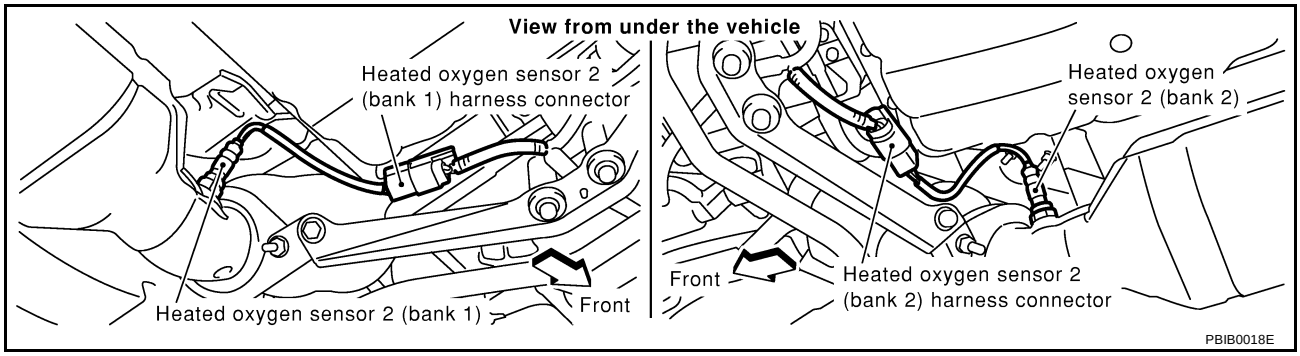
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	G	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS002J6

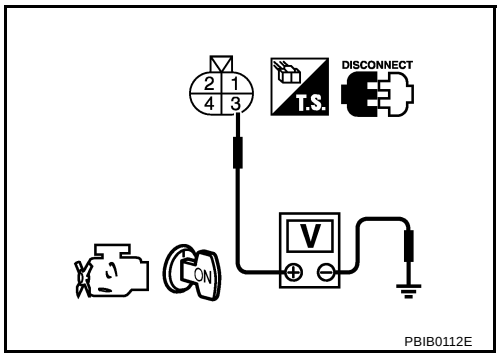
1. CHECK HO2S2 POWER SUPPLY CIRCUIT

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



3. Turn ignition switch "ON".
4. Check voltage between HO2S2 terminal 3 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 B11, E211
- Harness connectors E35, E305
- Fuse block (J/B) No. 1 connector B1
- 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 and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0141	10	2	1
P0161	11	2	2

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between ECM and heated oxygen sensor 2

>> Repair harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-300, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

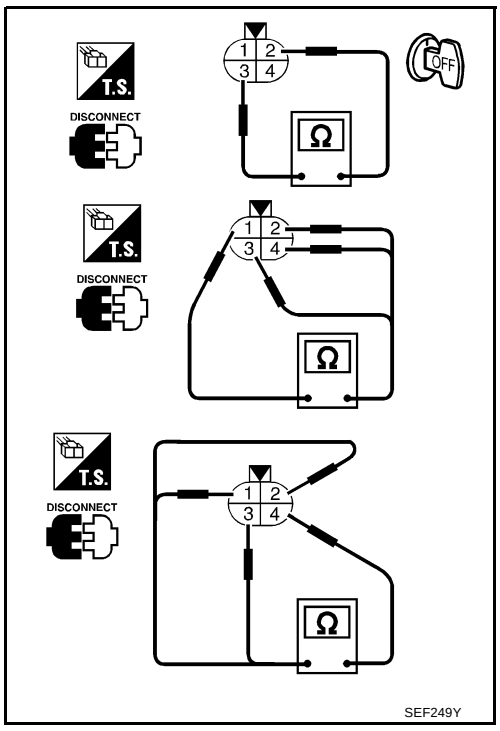
EBS002J7

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

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 heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS002J8

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0171 (BANK 1), P0174 (BANK 2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

PFP:16600

On Board Diagnosis Logic

EBS000UY

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 lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (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

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large.
(The mixture ratio is too lean.)

Possible Cause

EBS000UZ

- Intake air leaks
- Heated oxygen sensor 1
- Fuel injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor

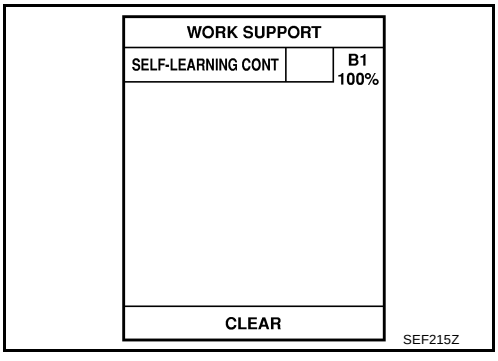
DTC Confirmation Procedure

EBS000V0

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

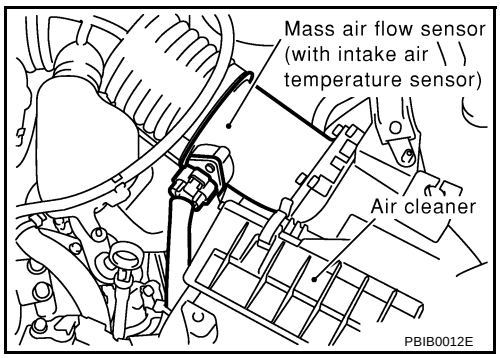
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-305 .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-305 . If engine does not start, check exhaust and intake air leak visually.



WITH GST

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

3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0100.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-305 .

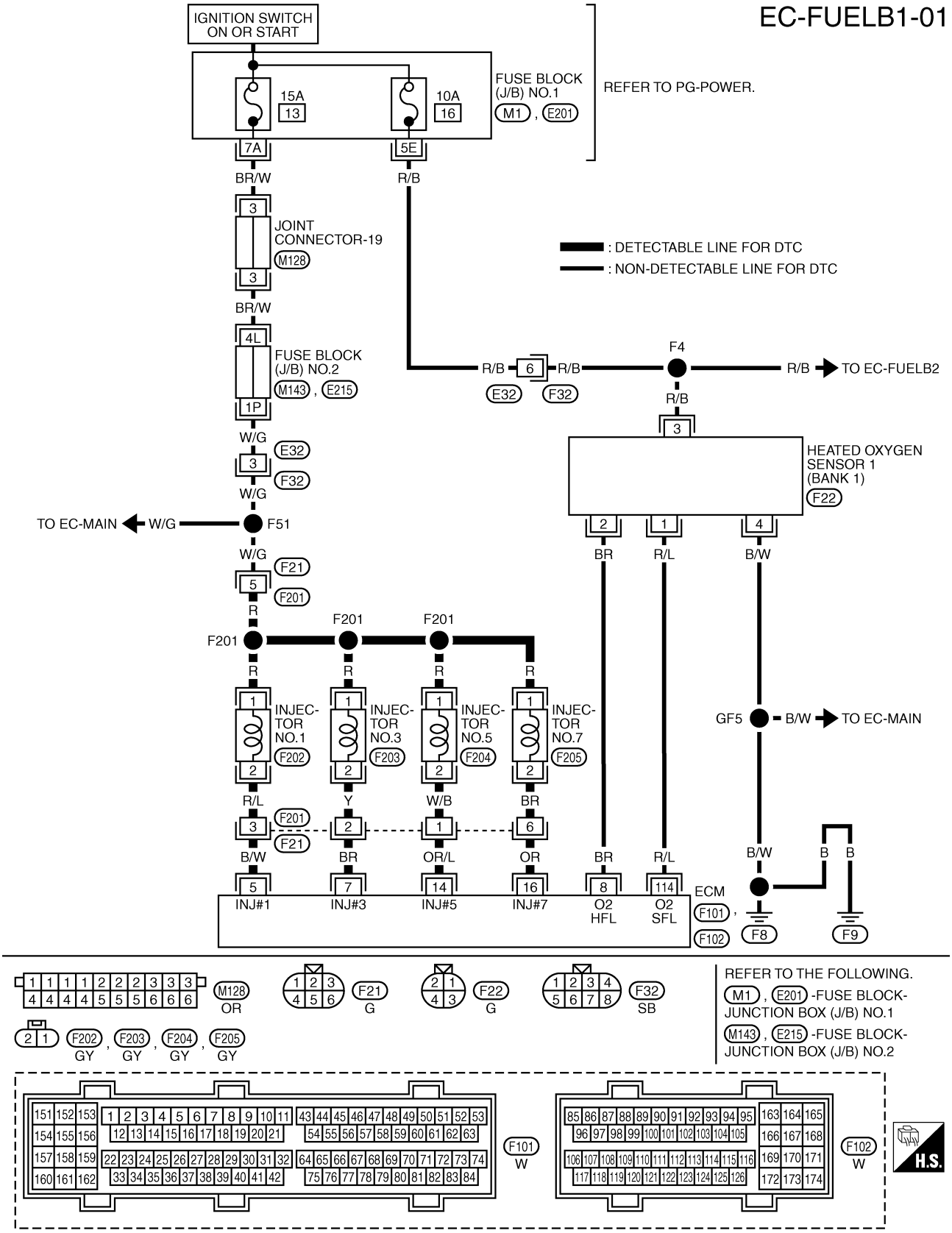


9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-XX . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

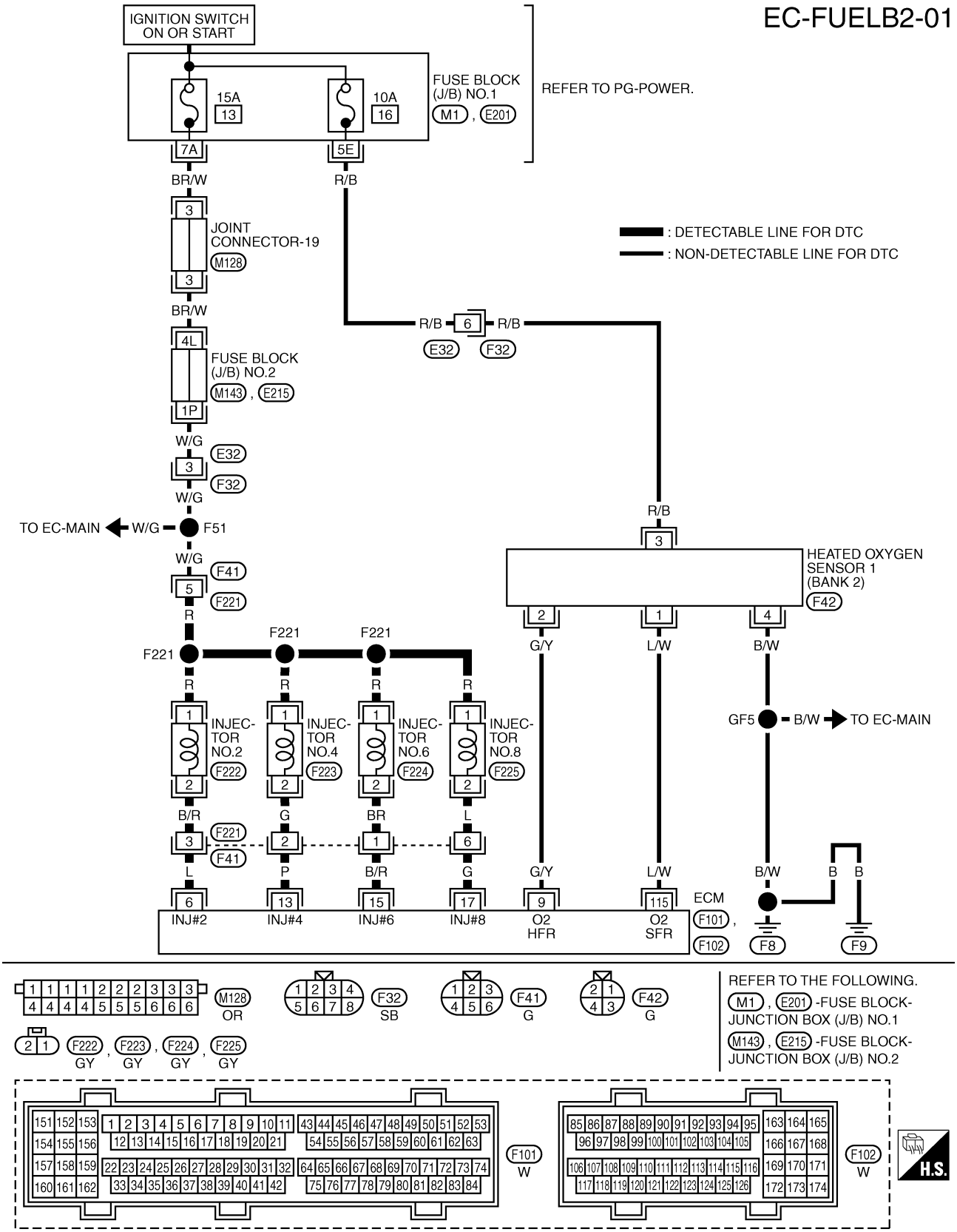
EBS000V1

BANK 1



TBWM0018E

BANK 2



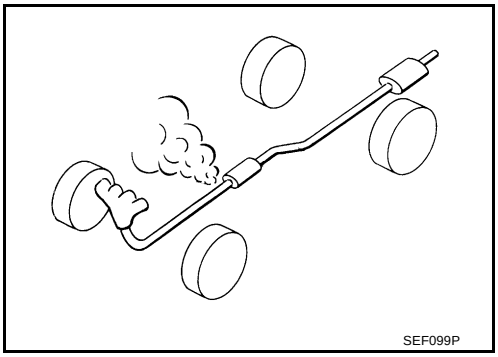
TBWM0019E

Diagnostic Procedure

EBS000V2

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



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 mass air flow 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 corresponding heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	114	1	1
P0174	115	1	2

Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	114	1	1
P0174	115	1	2

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-48, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-48, "FUEL PRESSURE CHECK" .

At idling:

When fuel pressure regulator valve vacuum hose is connected.	**235 kPa (2.4 kg/cm^2 , 34 psi)**
When fuel pressure regulator valve vacuum hose is disconnected.	**294 kPa (3.0 kg/cm^2 , 43 psi)**

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-472 , EC-592 .)
- Fuel pressure regulator (Refer to EC-49 .)
- Fuel lines (Refer to MA-14, "Checking Fuel Lines")
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.8 - 5.2 g·m/sec:	**at idling**
16.0 - 21.5 g·m/sec:	**at 2,500 rpm**

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.8 - 5.2 g·m/sec:	**at idling**
16.0 - 21.5 g·m/sec:	**at 2,500 rpm**

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-154, "DTC P0100 MASS AIR FLOW (MAF) SENSOR" .

7. 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.

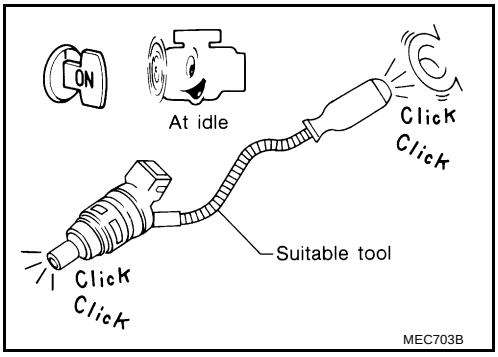
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

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

Clicking noise should be heard.



MEC703B

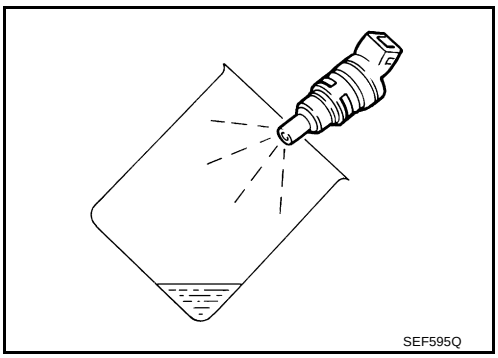
OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for “INJECTORS”, EC-579 .

8. 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 on bank 2 (for DTC P0171), bank 1 (for DTC P0174).
4. Remove injector gallery assembly. Refer to EM-30, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on bank 1 (for DTC P0171), bank 2 (for DTC P0174) 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.



SEF595Q

OK or NG

OK >> GO TO 9.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

DTC P0172 (BANK 1), P0175 (BANK 2) FUEL INJECTION SYSTEM FUNCTION (RICH)

PFP:16600

On Board Diagnosis Logic

EBS000V3

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 MIL (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

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large.
(The mixture ratio is too rich.)

Possible Cause

EBS000V4

- Heated oxygen sensor 1
- Fuel injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

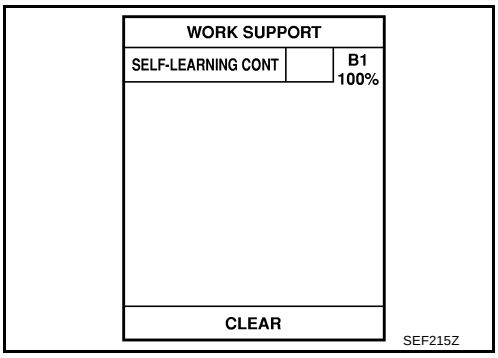
DTC Confirmation Procedure

EBS000V5

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

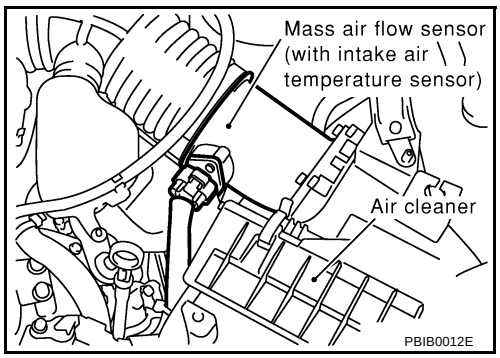
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-313 .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
   If engine starts, go to “Diagnostic Procedure”, EC-313 . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

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

3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6. Select “MODE 4” with GST and erase the 1st trip DTC P0100.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-313 .

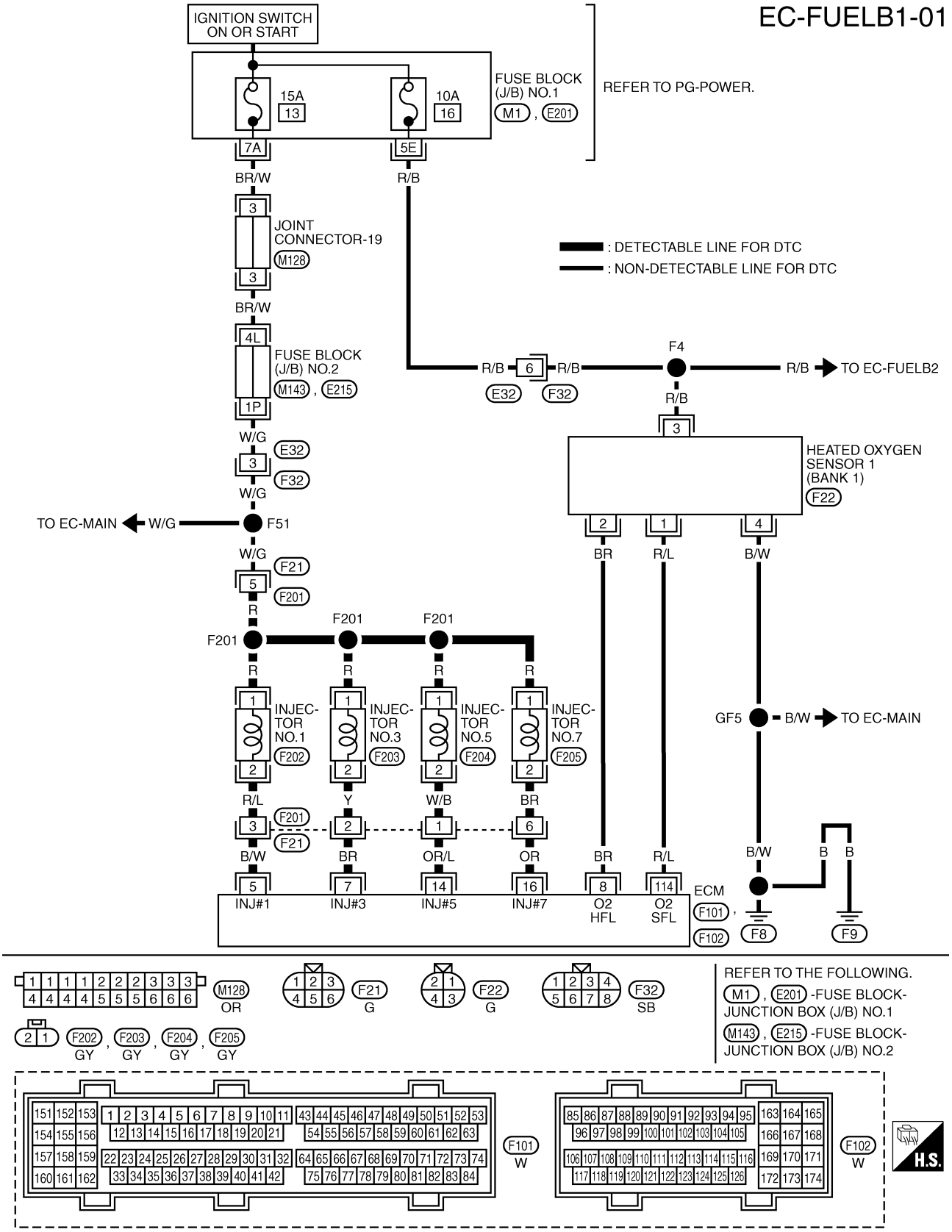


9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to “Diagnostic Procedure”, EC-313 . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

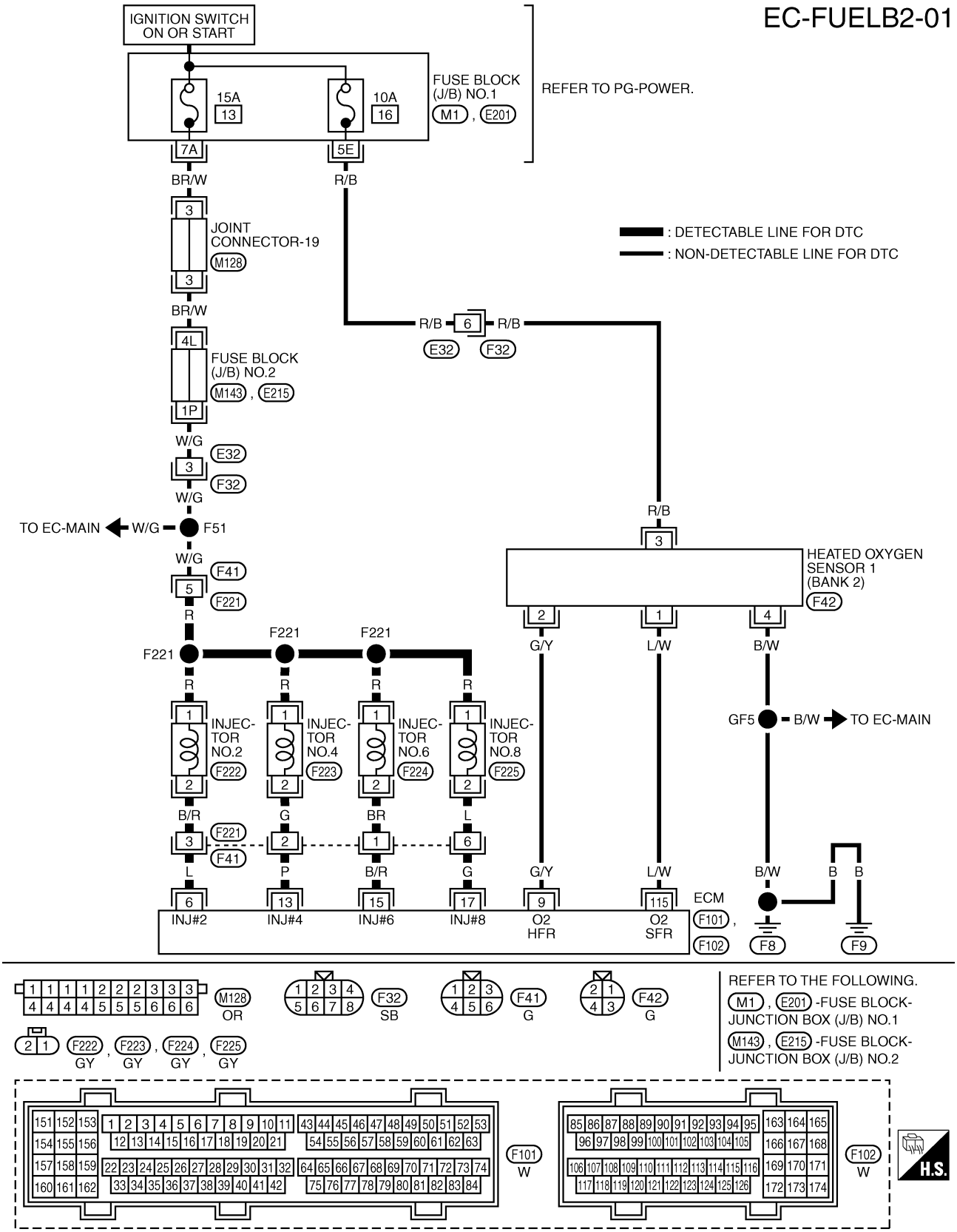
EBS000V6

BANK 1



TBWM0018E

BANK 2



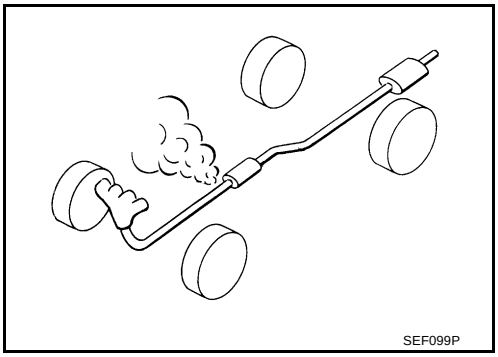
TBWM0019E

Diagnostic Procedure

EBS000V7

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



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 mass air flow 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 corresponding heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	114	1	1
P0175	115	1	2

Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	114	1	1
P0175	115	1	2

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-48, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-48, "FUEL PRESSURE CHECK" .

At idling:

When fuel pressure regulator valve vacuum hose is connected.	**235 kPa (2.4 kg/cm^2 , 34 psi)**
When fuel pressure regulator valve vacuum hose is disconnected.	**294 kPa (3.0 kg/cm^2 , 43 psi)**

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-472 , EC-592 .)
- Fuel pressure regulator (Refer to EC-49 .)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.8 - 5.2 g·m/sec:	**at idling**
16.0 - 21.5 g·m/sec:	**at 2,500 rpm**

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.8 - 5.2 g·m/sec:	**at idling**
16.0 - 21.5 g·m/sec:	**at 2,500 rpm**

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-154, "DTC P0100 MASS AIR FLOW (MAF) SENSOR" .

7. 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.

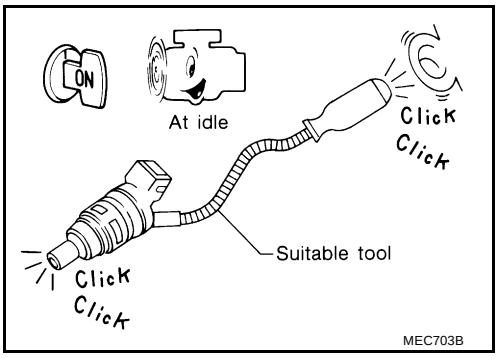
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

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 8.
NG >> Perform trouble diagnosis for “INJECTORS”, EC-579 .

8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-30, "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 bank 2 (for DTC P0172), bank 1 (for P0175).
   The injector harness connectors on bank 1 (for P0172), bank 2 (for P0175) 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 9.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

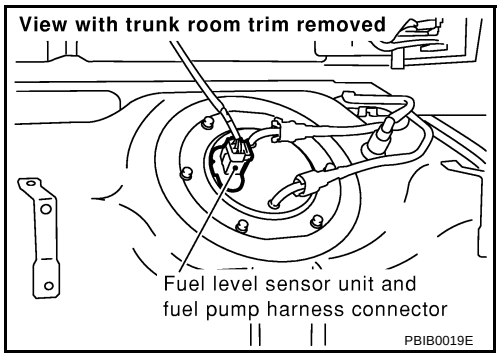
DTC P0180 FUEL TANK TEMPERATURE (FTT) SENSOR

PFP:22630

Component Description

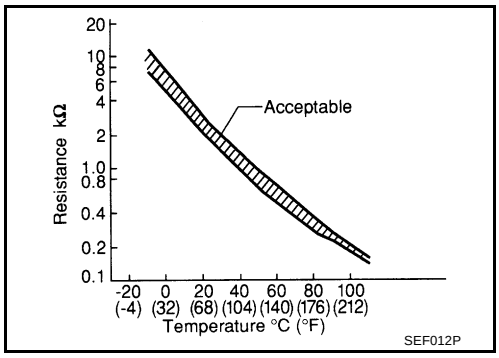
EBS002J9

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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>

Fuel temperature°C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminal 92 (Fuel tank temperature sensor) and body 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

EBS002JA

Malfunction is detected when an excessively high or low voltage is sent to ECM, rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

Possible Cause

EBS002JB

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

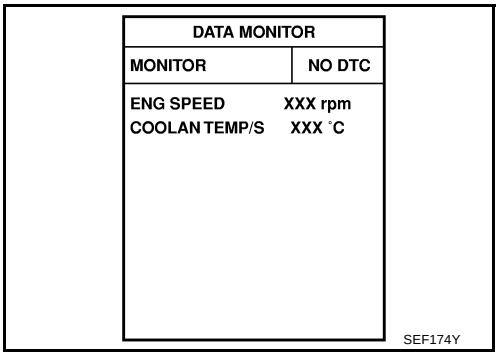
EBS002JC

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 10 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-319
   .
   If 1st trip DTC is not detected, go to following step.
4. Check “COOLAN TEMP/S” value.
   If “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.



If “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.

5. Cool engine down until “COOLAN TEMP/S” is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-319 .

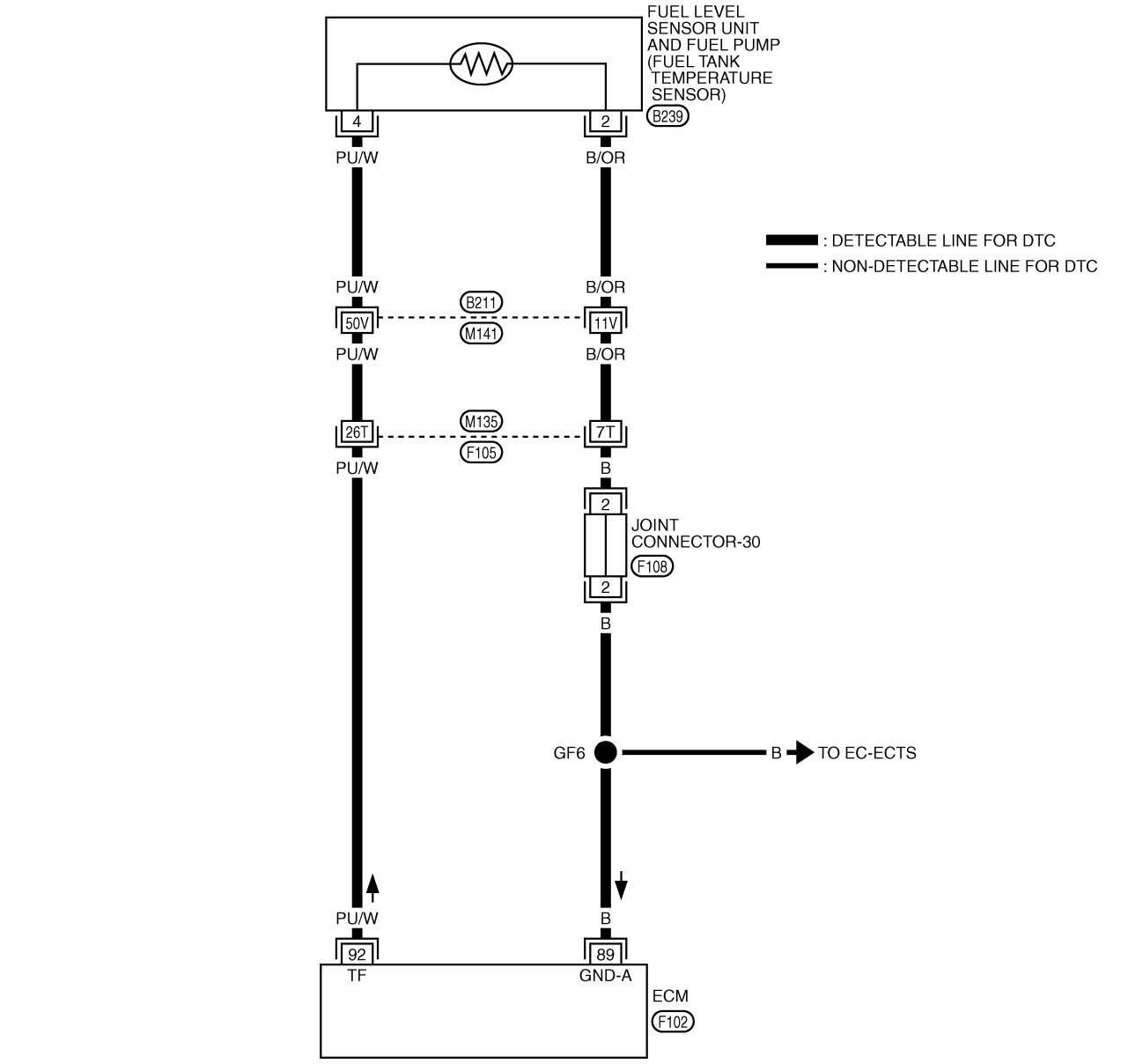
WITH GST

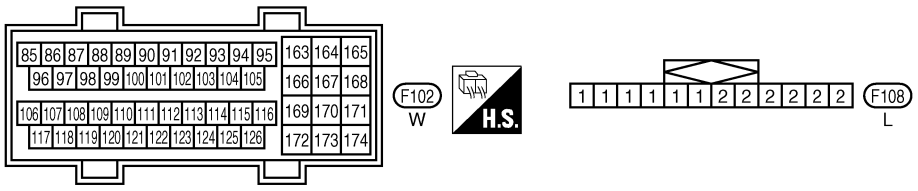
Follow the procedure “With CONSULT-II” above.

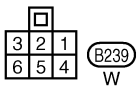
Wiring Diagram

EBS002JD

EC-FTTS-01







REFER TO THE FOLLOWING.
F105, B211 -SUPER MULTIPLE JUNCTION (SMJ)

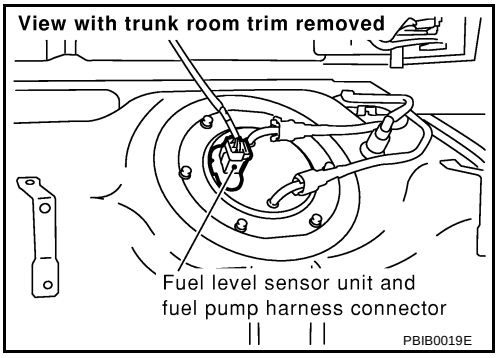
TBWM0020E

Diagnostic Procedure

EBS002JE

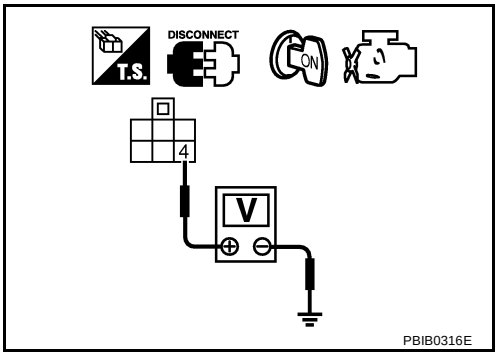
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between fuel level sensor unit and fuel pump terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B211, M141
- Harness connectors M135, F105
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

>> Repair harness or connector.

3. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 2 and body 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B211, M141
- Harness connectors M135, F105
- Joint connector-30
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

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

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to “Component Inspection”, EC-320 .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel level sensor unit.

6. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

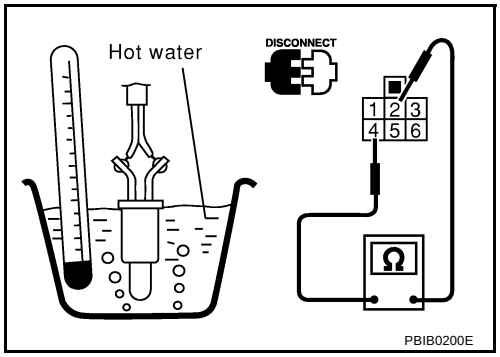
Component Inspection

EBS002JF

FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 2 and 4 by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



Removal and Installation

EBS002JG

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P0300 - P0308 NO. 8 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

PFP:00020

On Board Diagnosis Logic

EBS000VQ

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires, No. 6 cylinder misfires, No. 7 cylinder misfires and No. 8 cylinder misfires.

Possible Cause

EBS000VR

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Fuel injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1

DTC Confirmation Procedure

EBS000VS

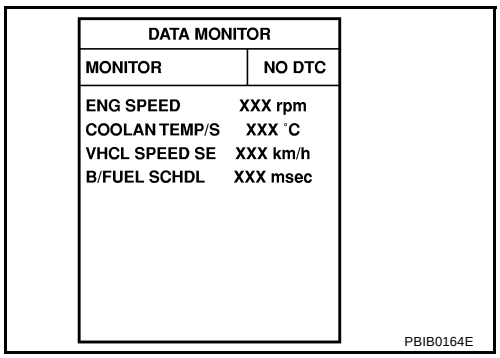
CAUTION:
Always drive vehicle at a safe speed.

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 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 “Diagnostic Procedure”, EC-322
   .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

EBS000VT

1. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

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

OK or NG

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

3. PERFORM POWER BALANCE TEST

With CONSULT-II

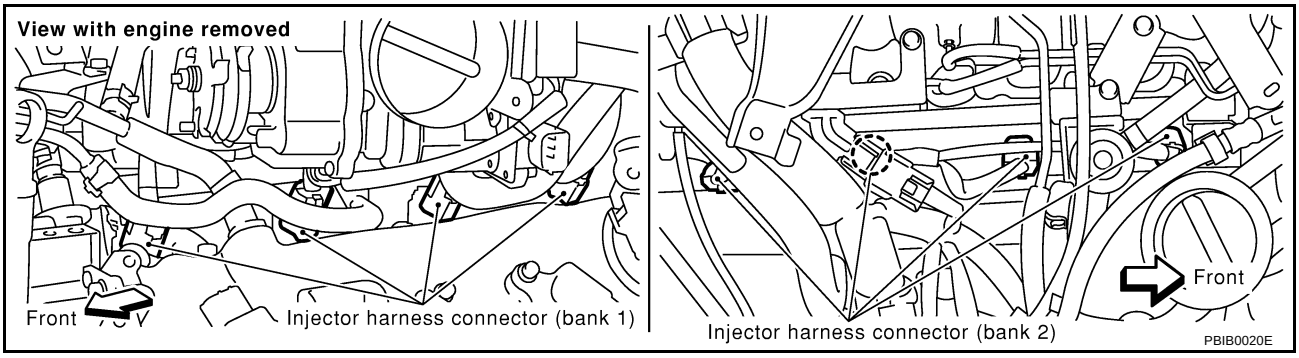
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

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?



Yes or No

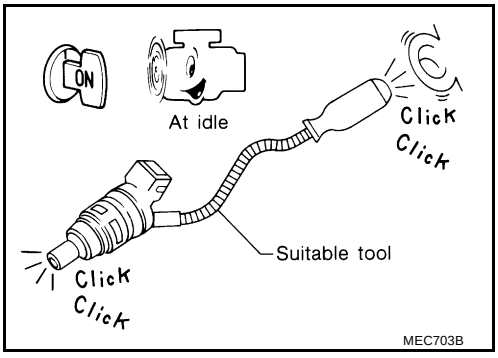
Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

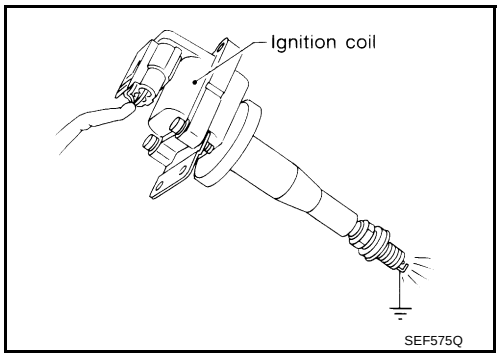
Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-579, "INJECTOR CIRCUIT" .



5. CHECK IGNITION SPARK

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

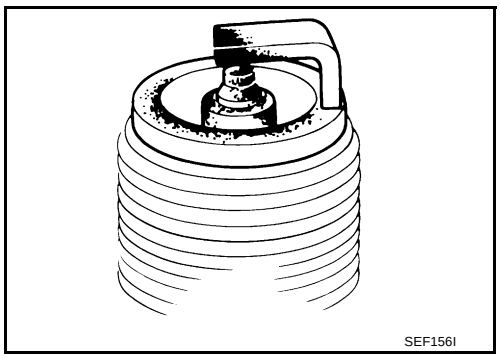


OK or NG

OK >> GO TO 6.
NG >> Check ignition coil, power transistor and their circuits. Refer to “DTC P1320 IGNITION SIGNAL”, EC-479 .

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-12, "ENGINE MAINTENANCE" .

7. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to ***EM-55, "CHECKING COMPRESSION PRESSURE"*** ,.

Standard:	**1,320 kPa (13.5 kg/cm^2 , 191 psi)/300 rpm**
Minimum:	**1,130 kPa (11.5 kg/cm^2 , 164 psi)/300 rpm**
Difference between each cylinder:	**98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

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-48, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-48, "FUEL PRESSURE CHECK" .

At idle:	**Approx. 235 kPa (2.4 kg/cm^2 , 34 psi)**

OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-472, "DTC P1220 FUEL PUMP CONTROL MODULE (FPCM)" , EC-592, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-49 .)
- Fuel lines (Refer to MA-14, "Checking Fuel Lines" .)
- Fuel filter for clogging

>> Repair or replace.

10. CHECK IGNITION TIMING

Check the following items. Refer to “Basic Inspection”, EC-82 .

Items	Specifications
Target idle speed	650 ± 50 rpm (in "P" or "N" position)
Ignition timing	17 ± 5° BTDC (in "P" or "N" position)

OK or NG

OK >> GO TO 11.
NG >> Follow the “Basic Inspection”.

11. CHECK HEATED OXYGEN SENSOR 1 BANK 1/BANK 2

Refer to “Component Inspection”, EC-204 .

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

3.8 - 5.2 g·m/sec: at idling
16.0 - 21.5 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in MODE 1 with GST.

3.8 - 5.2 g·m/sec: at idling
16.0 - 21.5 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 13.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-154, "DTC P0100 MASS AIR FLOW (MAF) SENSOR" .

13. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in “Symptom Matrix Chart”, EC-86 .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace.

14. 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-63, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

DTC P0325 (BANK 1), P0330 (BANK 2) KNOCK SENSOR (KS)

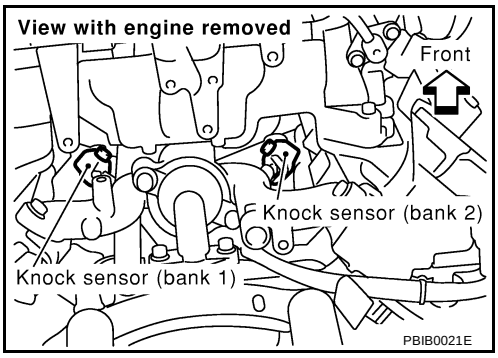
PFP:22060

Component Description

EBS002JH

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.

Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction.



On Board Diagnosis Logic

EBS002JI

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

Possible Cause

EBS002JJ

- Harness or connectors
  (The knock sensor circuit is open or shorted.)
- Knock sensor

DTC Confirmation Procedure

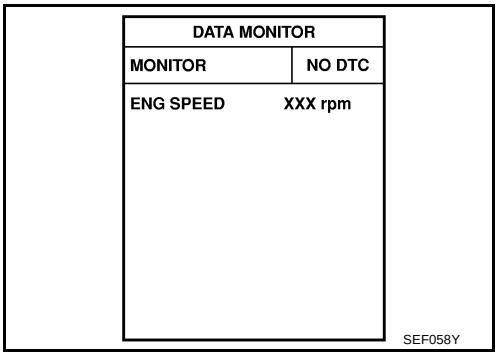
EBS002JK

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-329, "Diagnostic Procedure"
   .



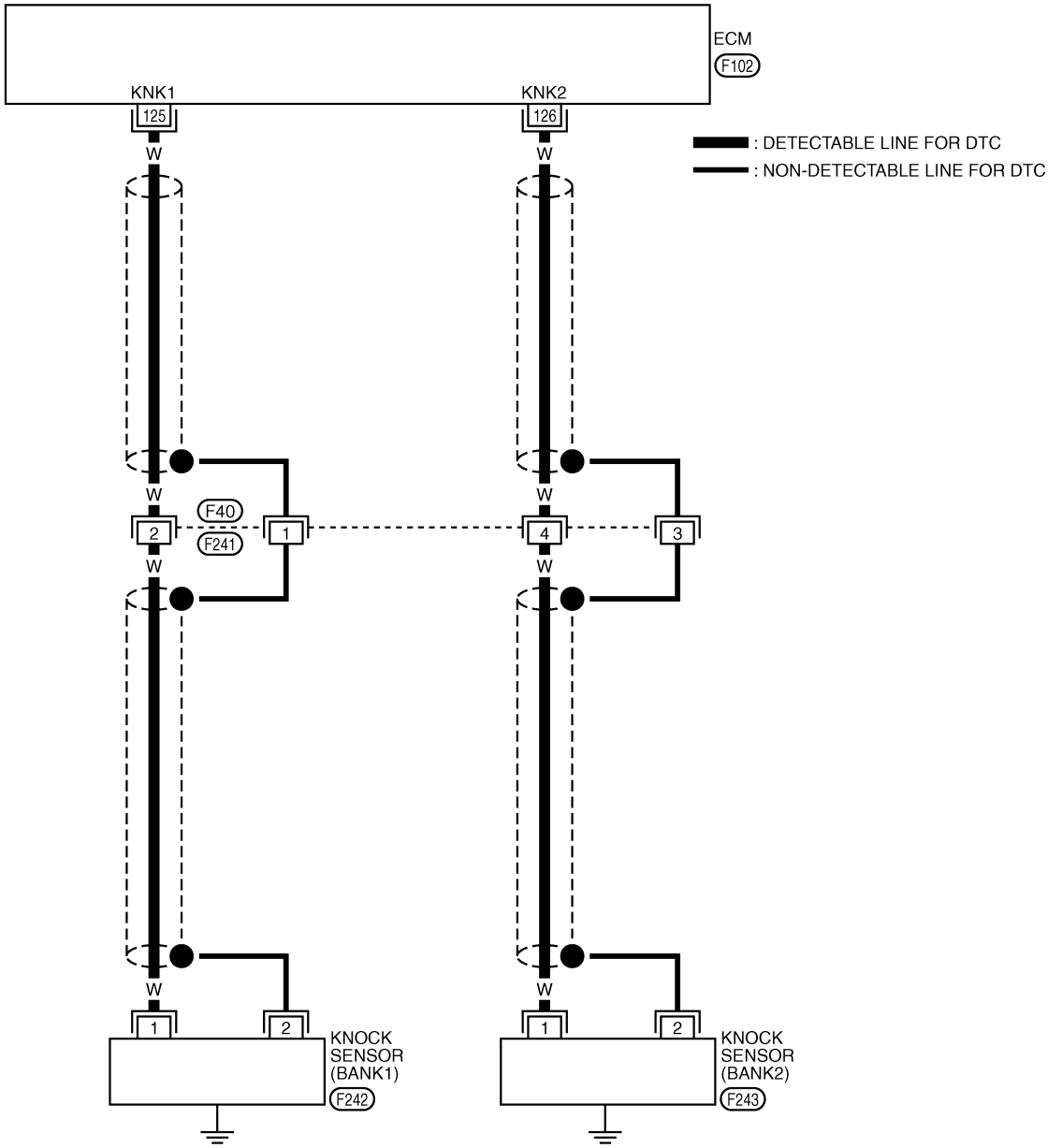
WITH GST

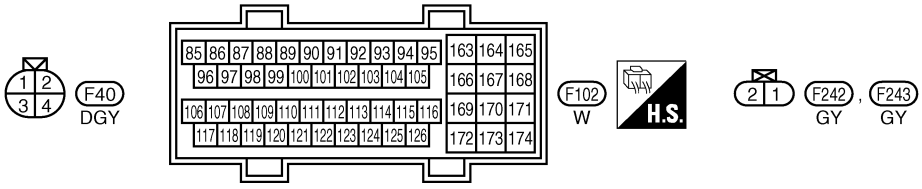
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS002JL

EC-KS-01





TBWM0021E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
125 126	W W	Knock sensor (bank 1) Knock sensor (bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

EBS002JM

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 125, 126 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.

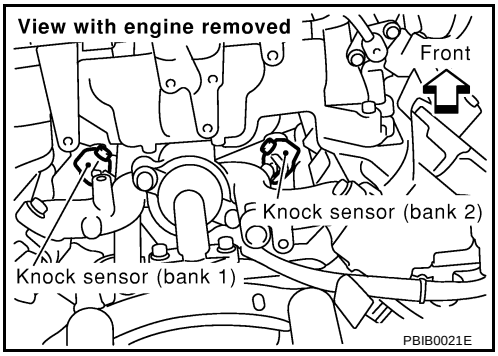
OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 125 and knock sensor (bank 1) terminal 1, ECM terminal 126 and knock sensor (bank 2) terminal 1. Refer to Wiring Diagram.

   Continuity should exist.
3. Also check harness for short to ground and short to power.



OK or NG

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F40, F241
- Harness for open or short between ECM and knock sensor

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

4. CHECK KNOCK SENSOR

Refer to EC-330, "Component Inspection" .

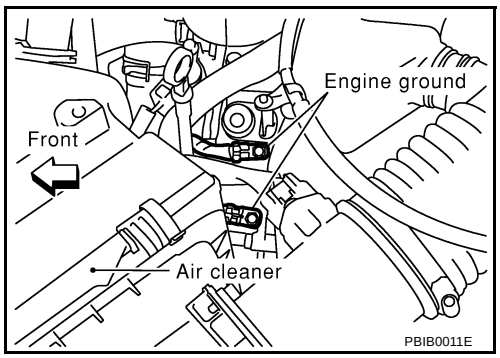
OK or NG

OK >> GO TO 7.
NG >> Replace knock sensor.

5. RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.

>> GO TO 6.



6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F40, F241.
2. Check harness continuity between harness connector F241 terminals 1, 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS002JN

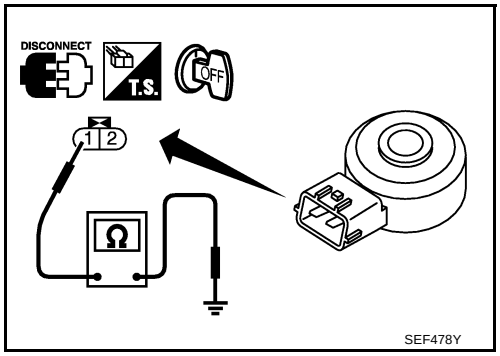
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

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

Resistance: Approximately 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.



Removal and Installation

EBS002JO

KNOCK SENSOR

Refer to EM-67, "CYLINDER BLOCK" .

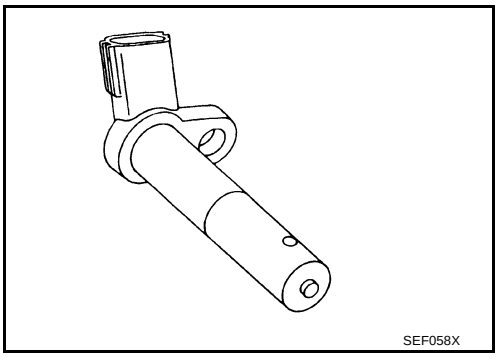
DTC P0335 CRANKSHAFT POSITION (CKP) SENSOR (POS)

PFP:23731

Component Description

EBS002JP

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.


SEF058X

CONSULT-II Reference Value in Data Monitor Mode

EBS002JQ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED·	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

On Board Diagnosis Logic

EBS002JR

Malfunction is detected when
(Malfunction A) the crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking,
(Malfunction B) the proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running,
(Malfunction C) the crankshaft position sensor (POS) signal is not in the normal pattern during engine running.

Possible Cause

EBS002JS

- Harness or connectors
  [The crankshaft position sensor (POS) circuit is open or shorted.]
- Crankshaft position sensor (POS)

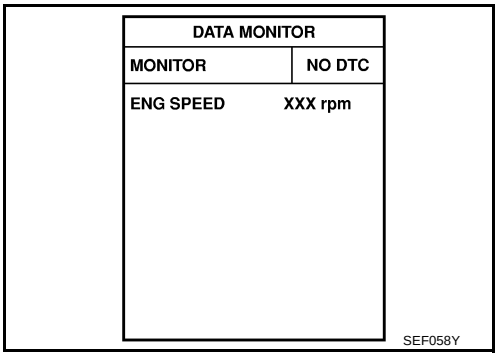
DTC Confirmation Procedure

EBS002JT

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-336, "Diagnostic Procedure"
   .



SEF058Y

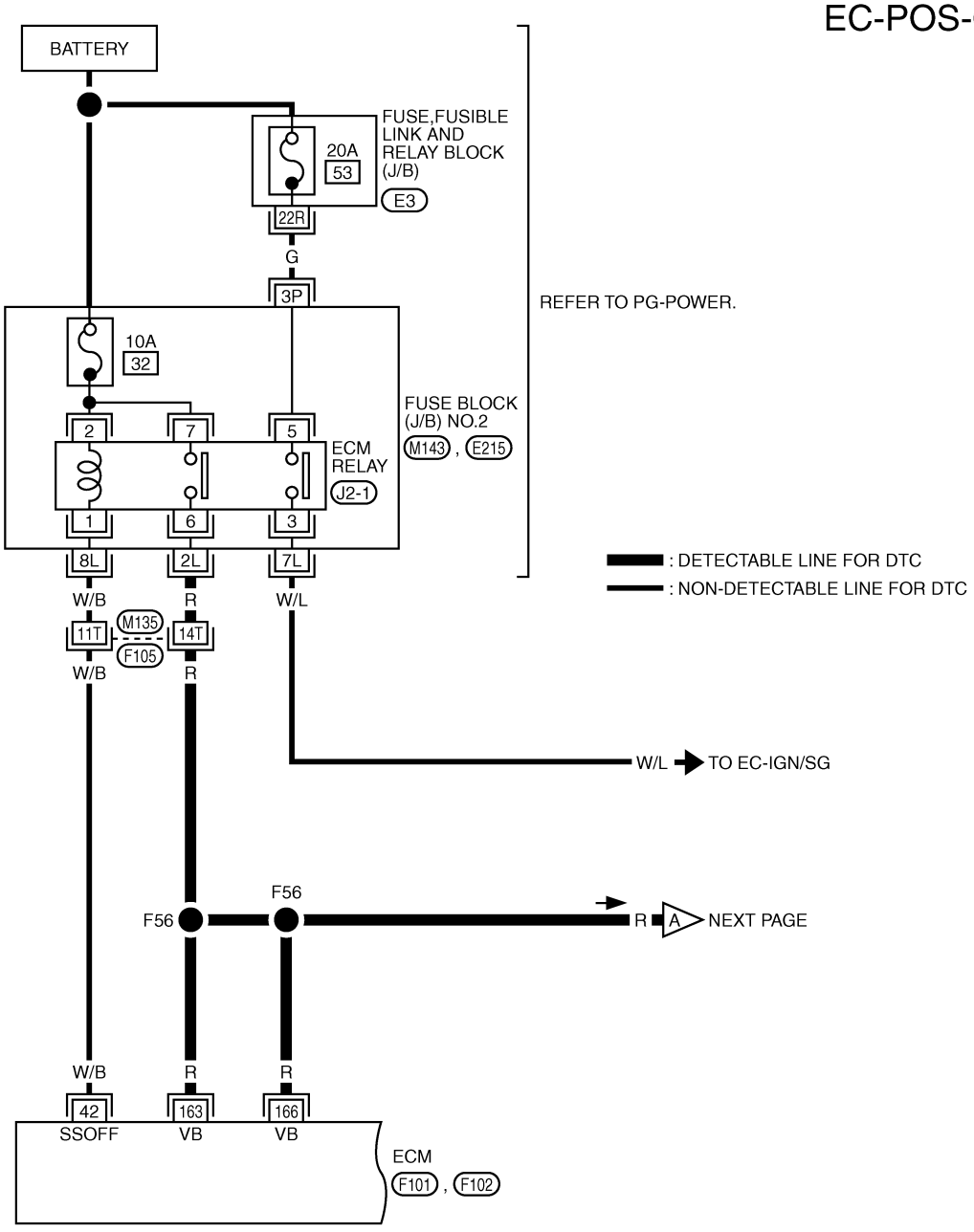
WITH GST

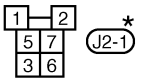
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002JU

EC-POS-01





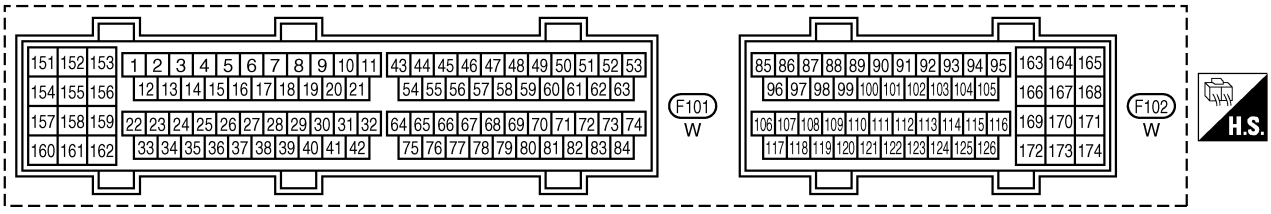
*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M143 , E215 -FUSE BLOCK-JUNCTION BOX (J/B) NO.2

E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

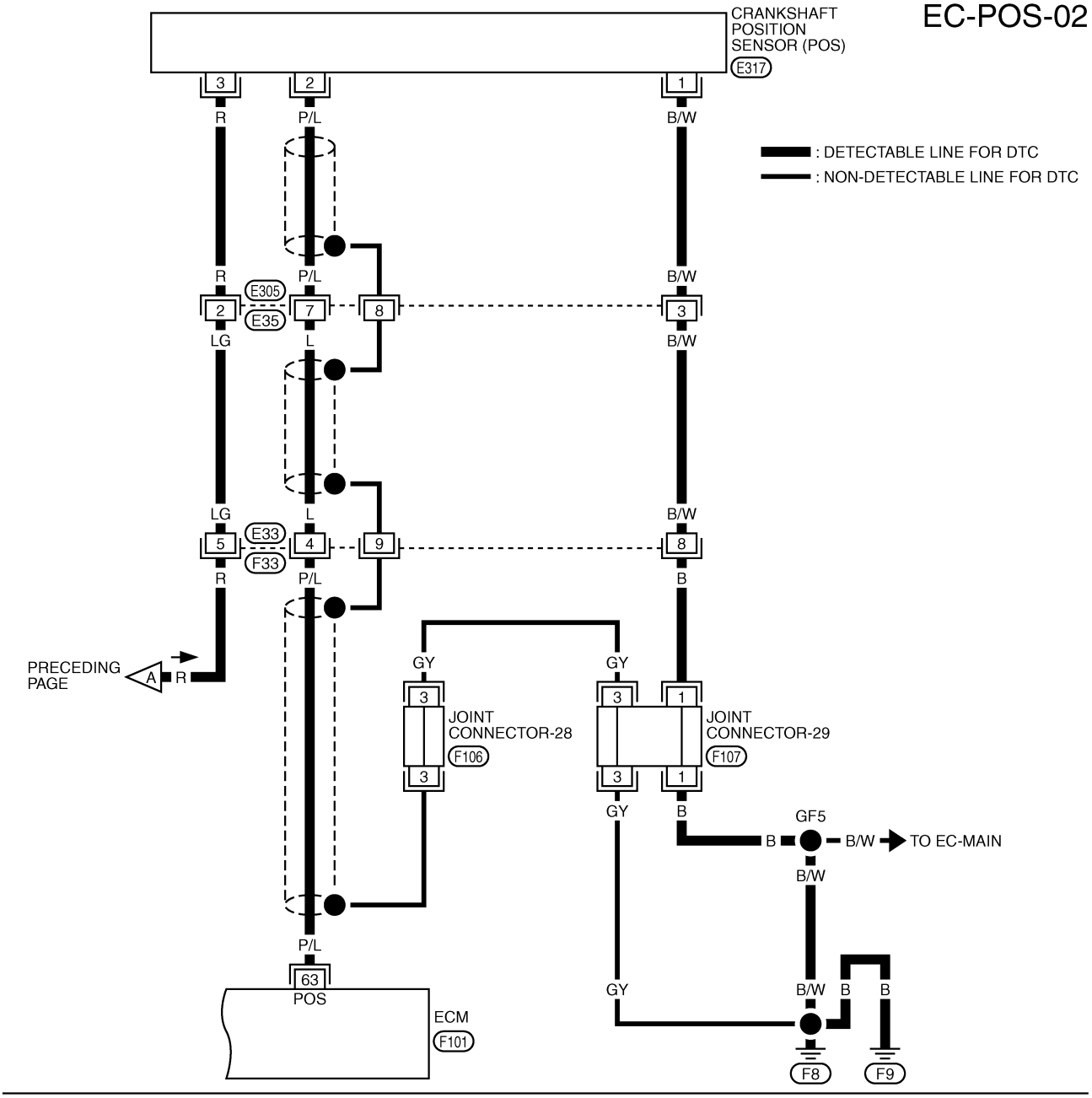


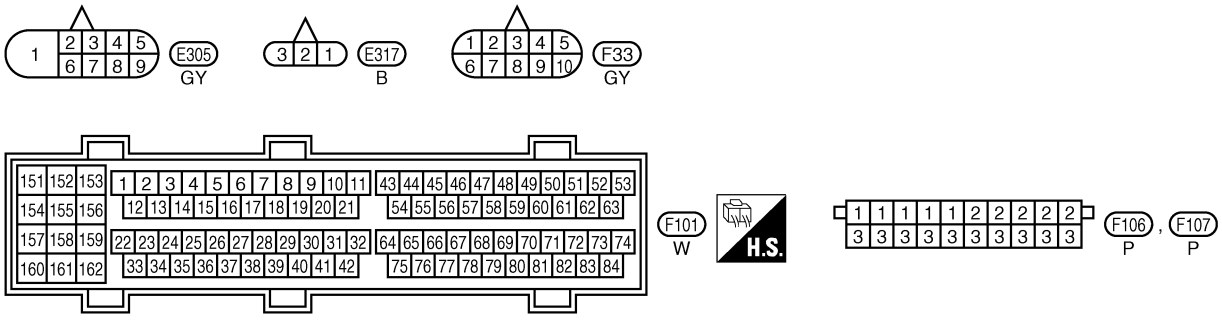
TBWM0023E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	W/B	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)
163 166	R R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

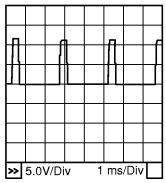
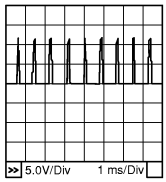




TBWM0110E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	P/L	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 2.0V★  PBIB0052E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 2.0V★  PBIB0053E

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

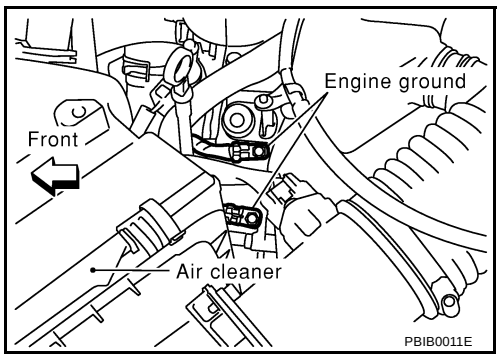
Diagnostic Procedure

EBS002JV

1. RETIGHTEN GROUND SCREWS

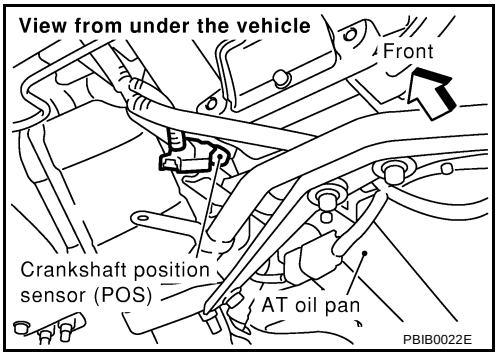
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch “ON”.



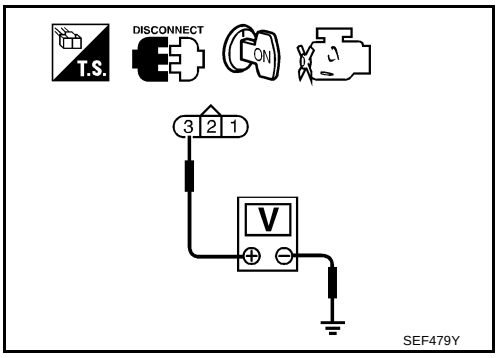
3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

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 E305, E35
- Harness connectors E33, F33
- Harness connectors F105, M135
- Harness for open or short between ECM and crankshaft position sensor (POS)
- Harness for open or short between ECM relay and crankshaft position sensor (POS)

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between CKP sensor (POS) terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors E33, F33
- Joint connector-29
- Harness for open or short between crankshaft position sensor (POS) and engine ground

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

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 63 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors E33, F33
- Harness for open or short between crankshaft position sensor (POS) and ECM

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

8. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace crankshaft position sensor (POS).

9. CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors E35, E305.
2. Check harness continuity between harness connector E35 terminal 8 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors F33, E33
- Joint connector-28
- Joint connector-29
- Harness for open or short between harness connector E35 and engine ground

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

11. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

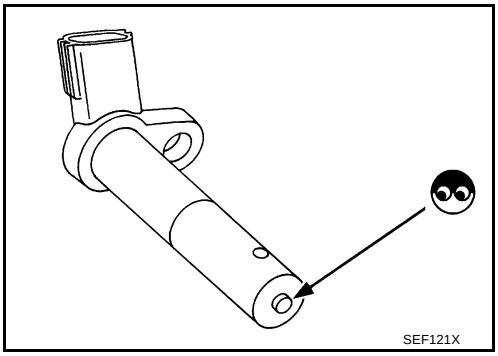
>> **INSPECTION END**

Component Inspection

EBS002JW

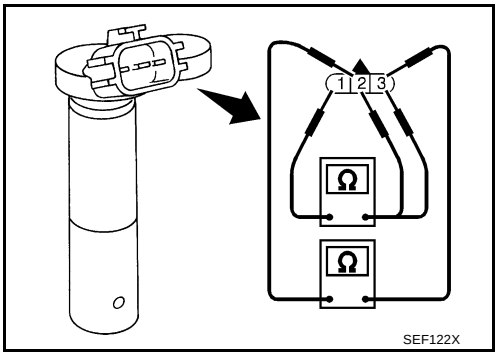
CRANKSHAFT POSITION SENSOR (POS)

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.


SEF121X

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
2 (+) - 1 (-)	
3 (+) - 2 (-)	



SEF122X

Removal and Installation

EBS002JX

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-67, "CYLINDER BLOCK" .

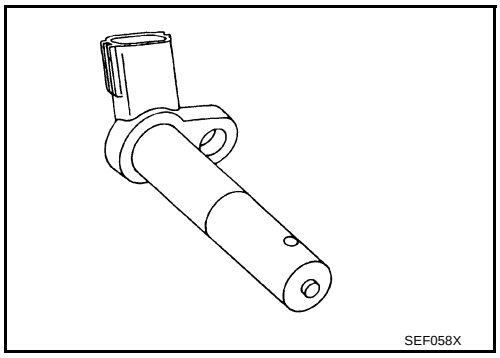
DTC P0340 CAMSHAFT POSITION (CMP) SENSOR (PHASE)

PFP:23731

Component Description

EBS002JY

The camshaft position sensor (PHASE) senses the protrusion with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor (POS) 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.


SEF058X

On Board Diagnosis Logic

EBS002JZ

Malfunction is detected when
(Malfunction A) the cylinder No. signal is not sent to ECM for the first few seconds during engine cranking,
(Malfunction B) the cylinder No. signal is not sent to ECM during engine running,
(Malfunction C) the cylinder No. signal is not in the normal pattern during engine running.

Possible Cause

EBS002K0

- Harness or connectors
  [The camshaft position sensor (PHASE) circuit is open or shorted.]
- Camshaft position sensor (PHASE)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

DTC Confirmation Procedure

EBS002K1

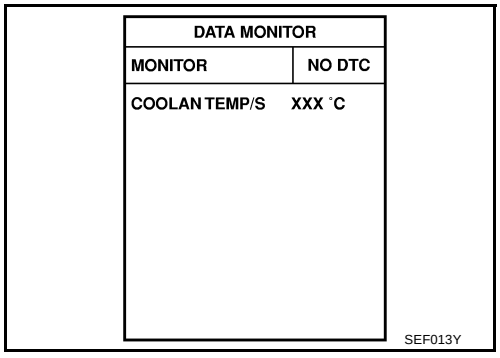
NOTE:

- 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-342, "Diagnostic Procedure"
   .



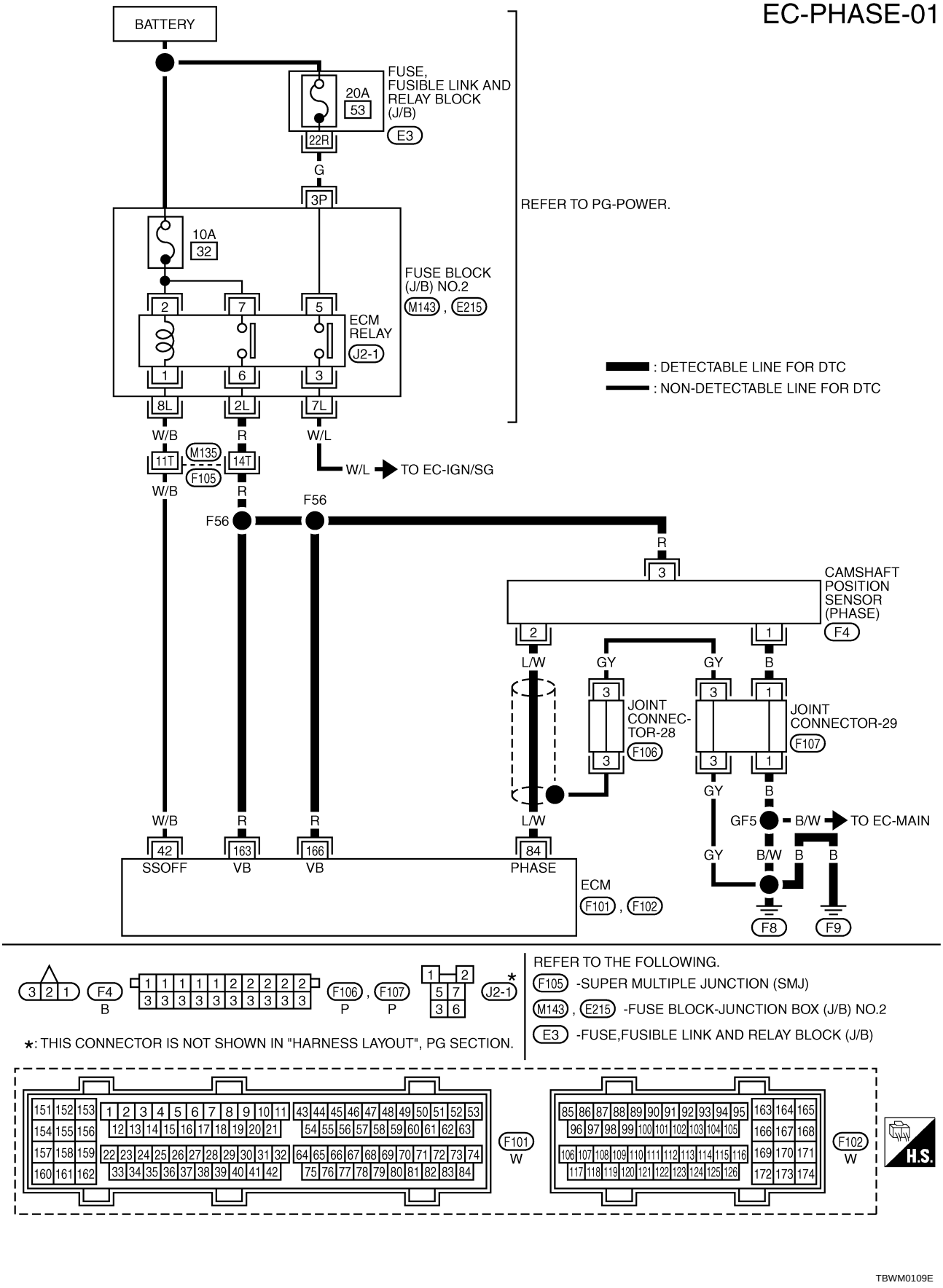
SEF013Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

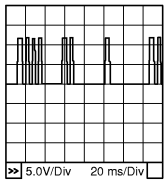
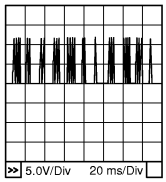
EBS002K2



TBWM0109E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0056E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0057E

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

Diagnostic Procedure

EBS002K3

1. CHECK STARTING SYSTEM

Turn ignition switch to “START” position.

Does the engine turn over?

Does the starter motor operate?

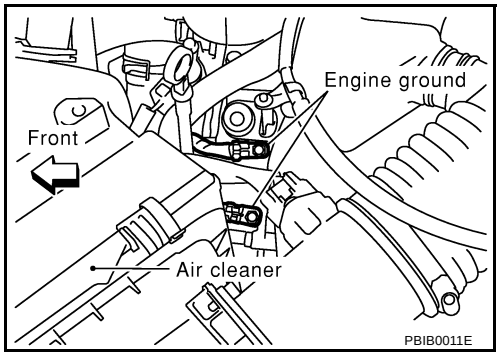
Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to ***SC-20, "STARTING SYSTEM"*** .)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

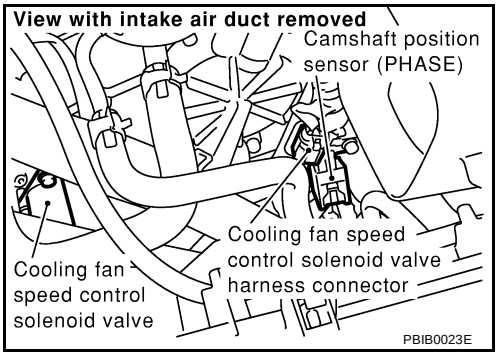
>> GO TO 3.



PBIB0011E

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

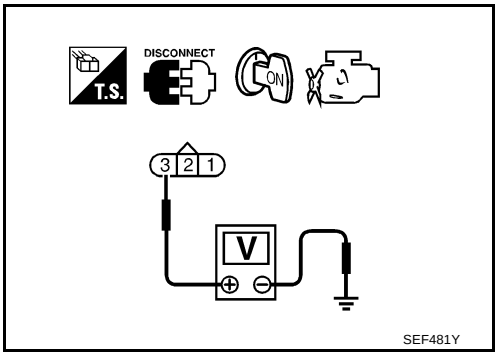
1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



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 F105, M135
- Harness for open or short between ECM and camshaft position sensor (PHASE)
- Harness for open or short between ECM relay and camshaft position sensor (PHASE)

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

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and engine ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-29
- Harness for open or short between camshaft position sensor (PHASE) and engine ground

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

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 84 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-344, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

9. CHECK CMPS (PHASE) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect joint connector-28.
3. Check the following.

- Continuity between joint connector terminal 3 and ground
- Joint connector-28
- Joint connector-29
  (Refer to PG-26, "Harness Layout" .)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-28.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

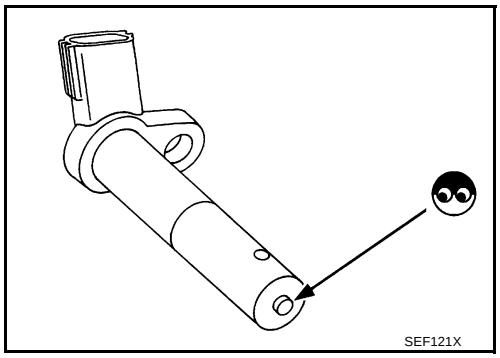
>> **INSPECTION END**

Component Inspection

EBS002K4

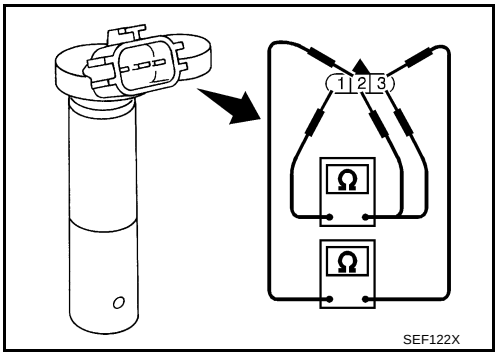
CAMSHAFT POSITION SENSOR (PHASE)

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.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
2 (+) - 1 (-)	
3 (+) - 2 (-)	



EBS002K5

Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-45, "TIMING CHAIN" .

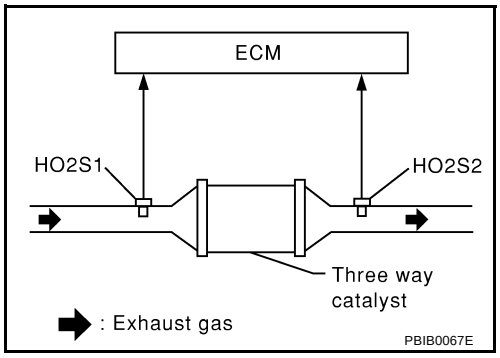
DTC P0420 (BANK 1), P0430 (BANK 2) THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

EBS000WZ

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.
Malfunction is detected when three way catalyst (Manifold) does not operate properly, three way catalyst (Manifold) does not have enough oxygen storage capacity.



Possible Cause

EBS000X0

- Three way catalyst (Manifold)
- Exhaust tube
- Intake air leaks
- Fuel injectors
- Fuel injector leaks
- Spark plug
- Improper ignition timing

DTC Confirmation Procedure

EBS000X1

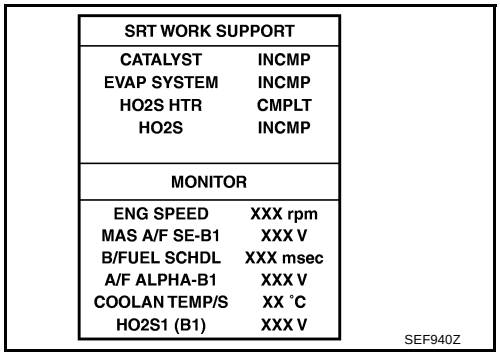
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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.**

1. Turn ignition switch “ON”.
2. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. 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 7
5. Wait 5 seconds at idle.



6. 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
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX ˚C
HO2S1 (B1)	XXX V

SEF941Z

7. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to EC-348, "Diagnostic Procedure" .

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

Overall Function Check

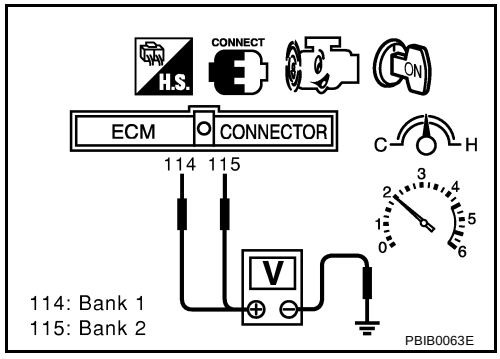
EBS0016L

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.

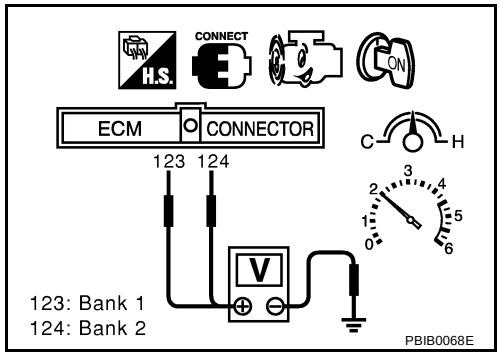
CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeters probes between ECM terminals 114 [HO2S1 (bank 1) signal], 115 [HO2S1 (bank 2) signal] and engine ground, and ECM terminals 123 [HO2S2 (bank 1) signal], 124 [HO2S2 (bank 2) signal] and engine ground.
4. Keep engine speed at 2,000 rpm constant under no load.



5. Make sure that the voltage switching frequency (high & low) between ECM terminals 123 and engine ground, or 124 and engine ground is very less than that of ECM terminals 114 and engine ground, or 115 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 does not operate properly. Go to EC-348, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 114 or 115 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for “DTC P0133, P0153” first. (See EC-220 .)

Diagnostic Procedure

EBS0016M

1. CHECK EXHAUST SYSTEM

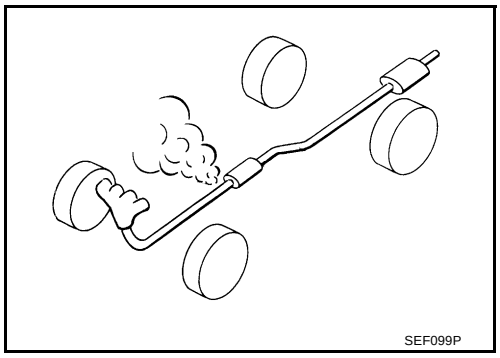
Visually check exhaust tubes and muffler for dent.

OK or NG

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

2. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the three way catalyst (Manifold).



OK or NG

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

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-82, "Basic Inspection" .

Items	Specifications
Ignition timing	17° ± 5° BTDC
Target idle speed	650 ± 50 rpm (in “P” or “N” position)

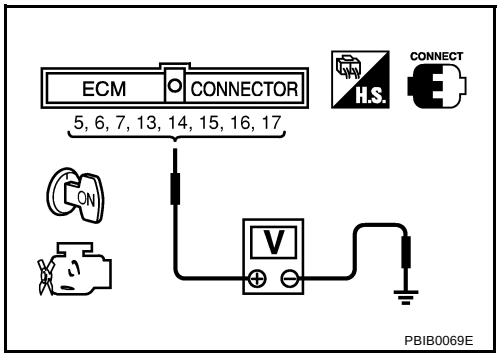
OK or NG

OK >> GO TO 5.
NG >> Follow the “Basic Inspection”.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-580 .
2. Stop engine and then turn ignition switch “ON”.
3. Check voltage between ECM terminals 5, 6, 7, 13, 14, 15, 16, 17 and ground with CONSULT-II or tester.

Battery voltage should exist.

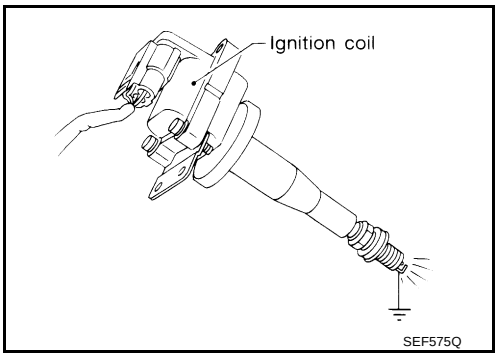


OK or NG

OK >> GO TO 6.
NG >> Perform EC-583, "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-479, "DTC P1320 IGNITION SIGNAL" .

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly.
   Refer to EM-30, "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-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (Manifold).

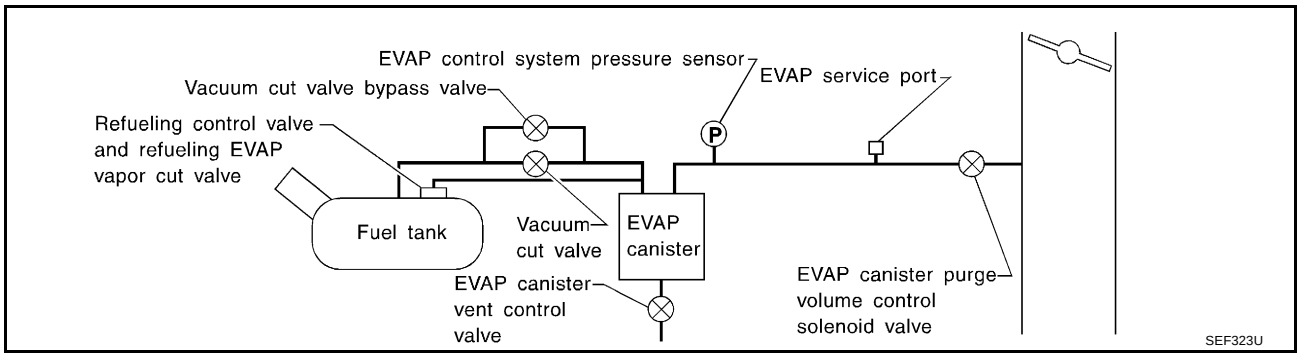
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

PFP:14950

On Board Diagnosis Logic

EBS0016N

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-522 .)
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

EBS0016O

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit

- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

EBS0016P

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-522 .)**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

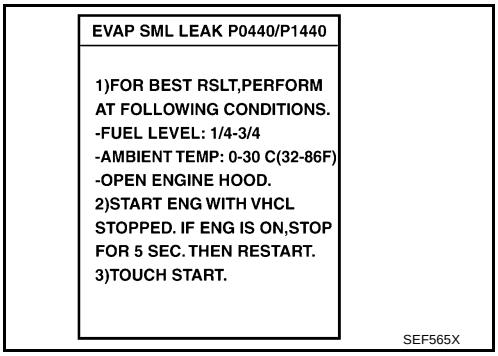
TESTING CONDITION:

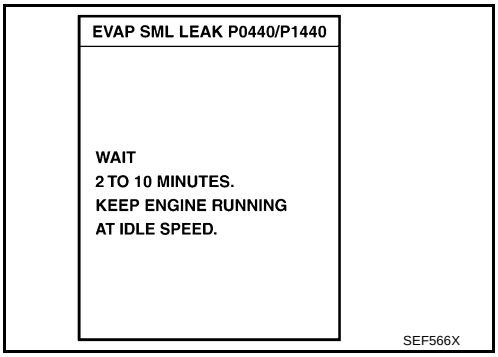
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

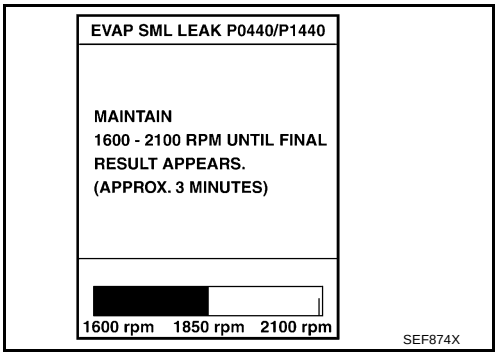
WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

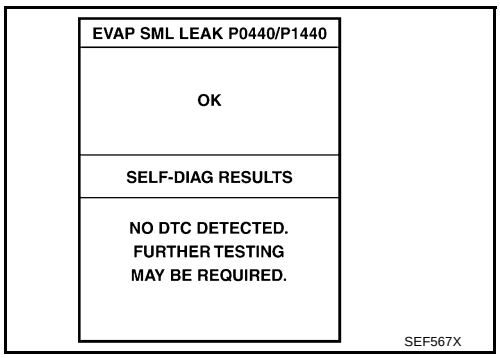
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-82, "Basic Inspection" .







6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-352, "Diagnostic Procedure" .
   NOTE:
   Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-61 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-61 .
3. Stop vehicle.
4. Select “MODE 1” with GST.

– If SRT of EVAP system is not set yet, go to the following step.
– If SRT of EVAP system is set, the result will be OK.

5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-61 .
8. Stop vehicle.
9. Select “MODE 3” with GST.

– If P0440 or P1440 is displayed on the screen, go to EC-352, "Diagnostic Procedure" .
– If P1447 is displayed on the screen, go to “Diagnostic Procedure” for DTC P1447, EC-518 .
– If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10. Select “MODE 1” with GST.

– If SRT of EVAP system is set, the result will be OK.
– If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

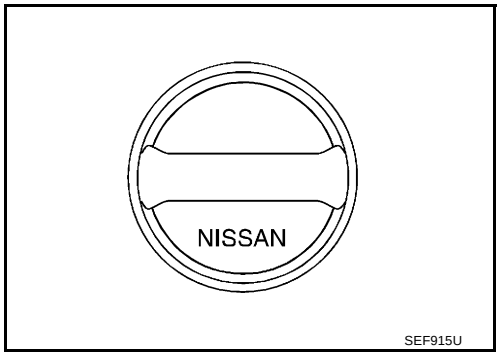
EBS0016Q

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
● Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-609, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

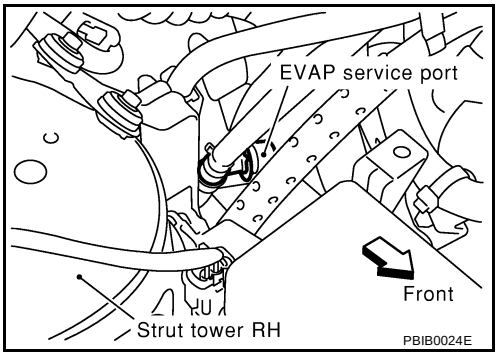
OK or NG

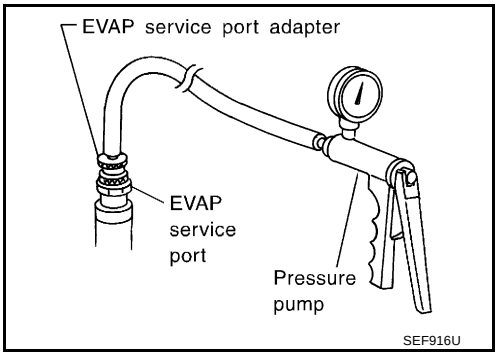
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





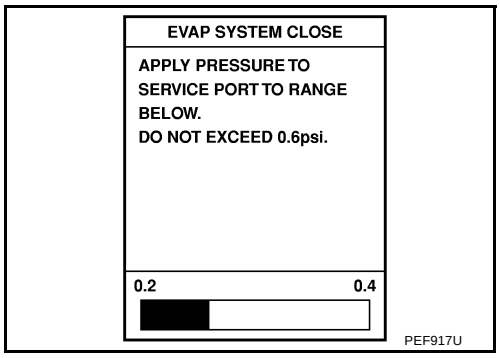
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

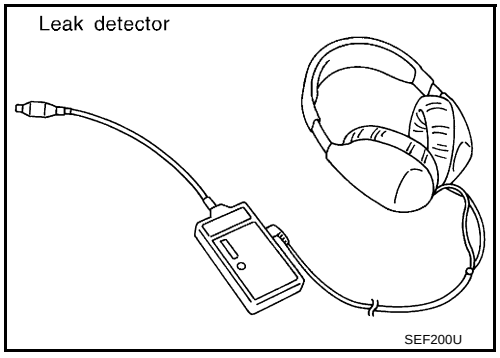
With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING"
   .



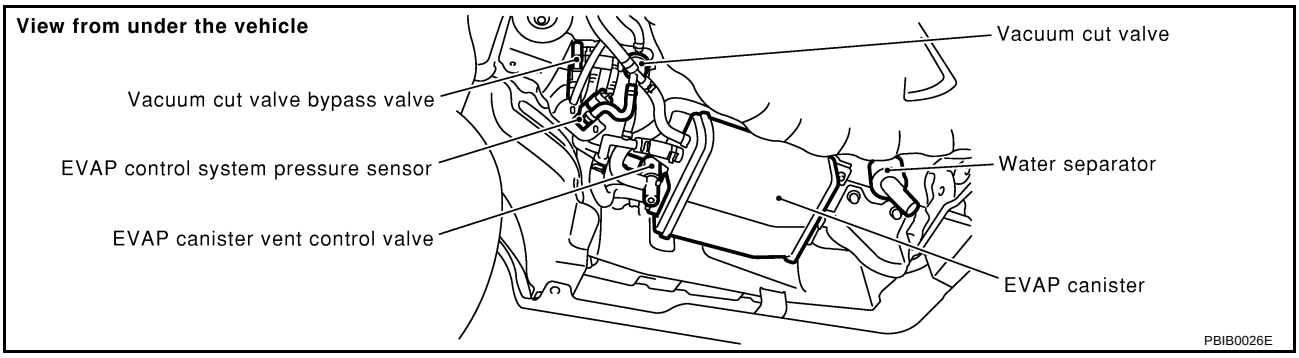
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

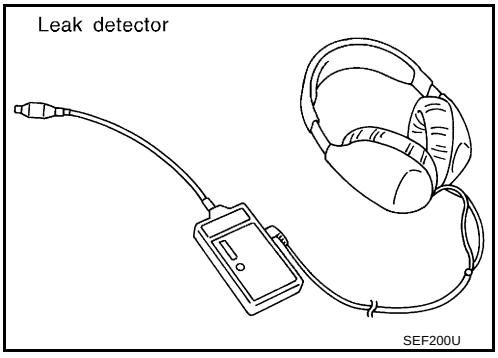
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

Refer to EC-359, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to “DTC Confirmation Procedure”, EC-523 .

OK or NG

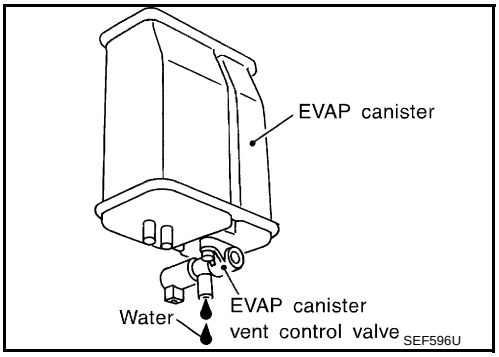
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.
No (With CONSULT-II)>>GO TO 13.
No (Without CONSULT-II)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

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

ACTIVE TEST	
PURG VOL CONT/V	0 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB0147E

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-24, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-365, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK ABSOLUTE PRESSURE SENSOR

Refer to EC-167, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace absolute pressure sensor.

18. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-320, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-380, "Component Inspection" .

OK or NG

OK >> GO TO 20.
NG >> Replace EVAP control system pressure sensor.

20. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 21.
NG >> Repair or reconnect the hose.

21. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 22.

22. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-612, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)".

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hoses and tubes.

23. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses, tubes or filler neck tube.

24. CHECK REFUELING CONTROL VALVE

Refer to EC-616, "Component Inspection" .

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

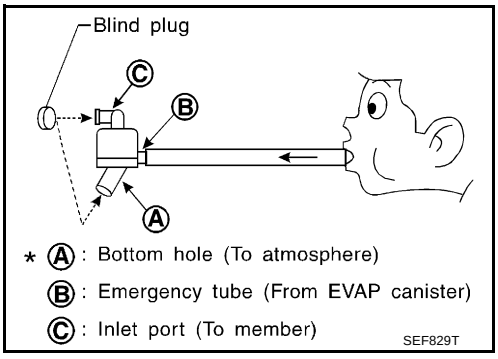
EBS0016R

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

PFP:14920

Description

EBS001FR

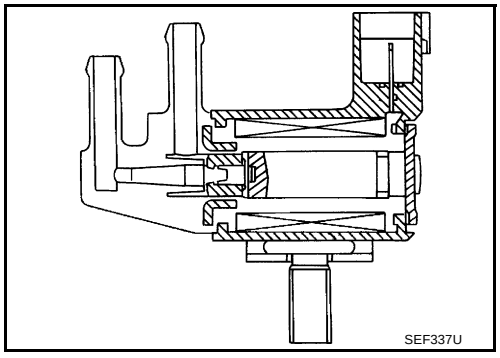
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed signal (CAN communication line)	Vehicle speed		

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

EBS001FS

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	—

On Board Diagnosis Logic

EBS001FT

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

EBS001FU

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

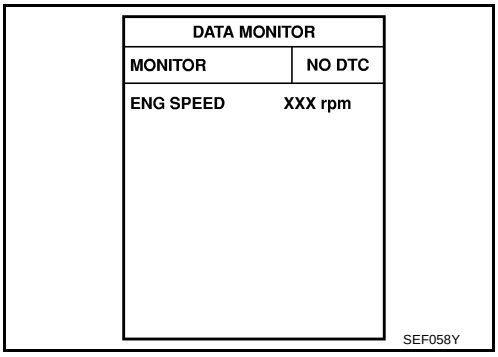
EBS001FV

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-363, "Diagnostic Procedure" .



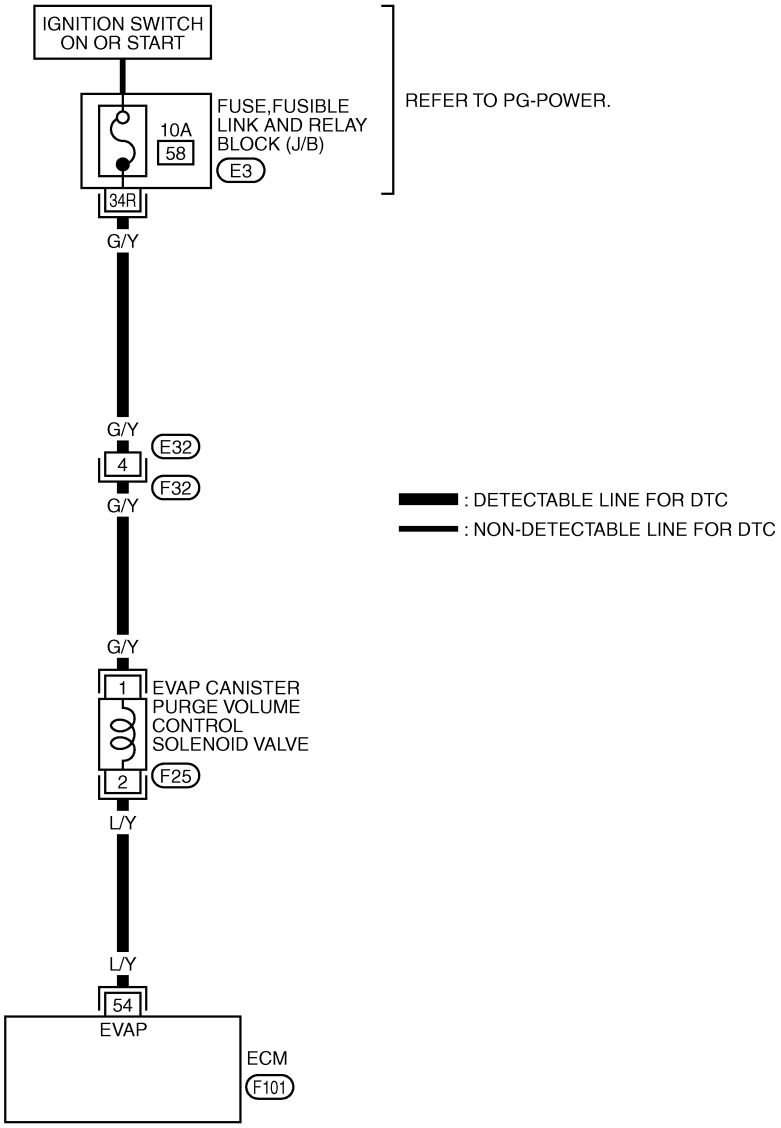
WITH GST

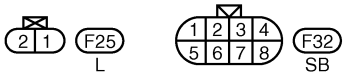
Follow the procedure “WITH CONSULT-II” above.

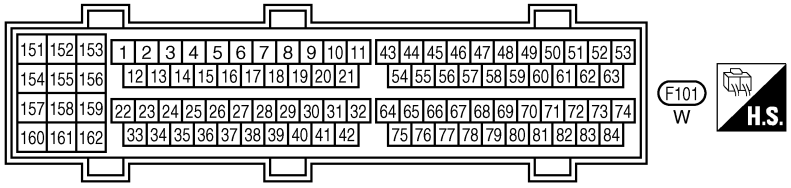
Wiring Diagram

EBS001FW

EC-PGC/V-01





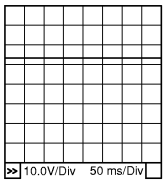
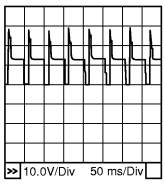


REFER TO THE FOLLOWING.
E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0039E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	L/Y	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).	BATTERY VOLTAGE (11 - 14V)★  PBIB0051E

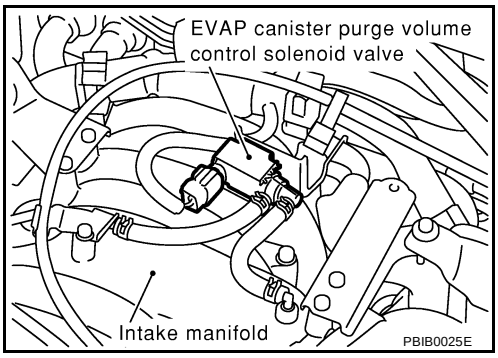
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS001FX

1. 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”.



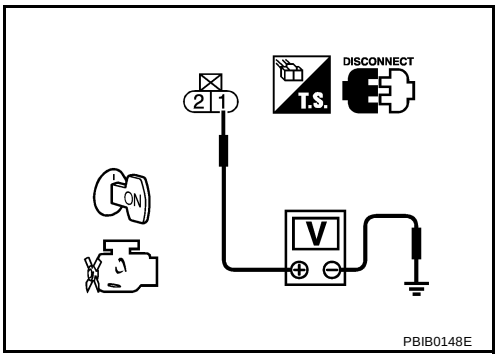
PBIB0025E

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 3.
NG >> GO TO 2.



PBIB0148E

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E32, F32
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> 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 54 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.

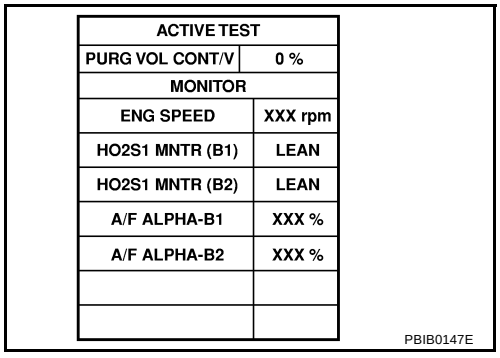
OK or NG

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.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-365, "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-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

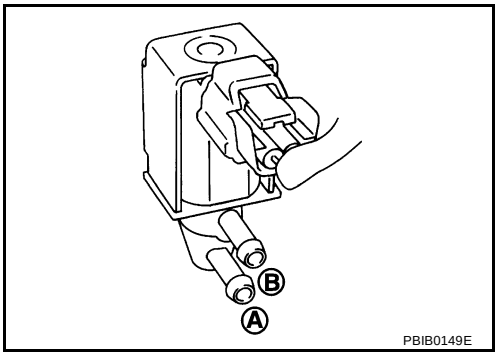
EBS001FY

EVAP CANISTER PURGE CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

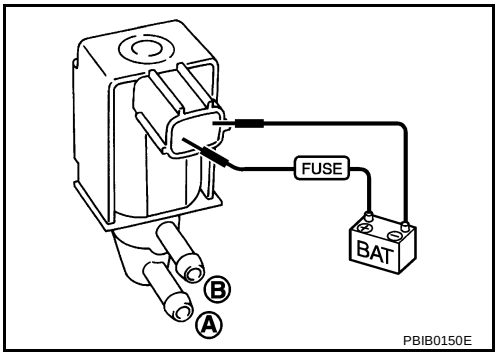
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No



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

EBS001FZ

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-17, "INTAKE MANIFOLD" .

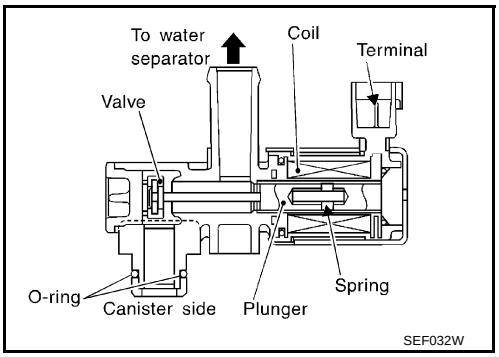
DTC P0446 EVAP CANISTER VENT CONTROL VALVE (CIRCUIT)

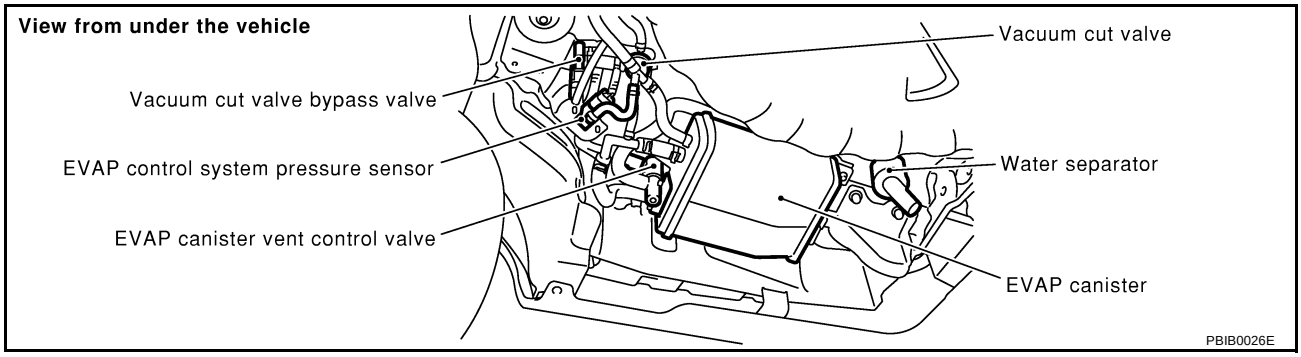
PFP:14935

Component Description

EBS0016S

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak)” diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

EBS0016T

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

EBS0016U

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

EBS0016V

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

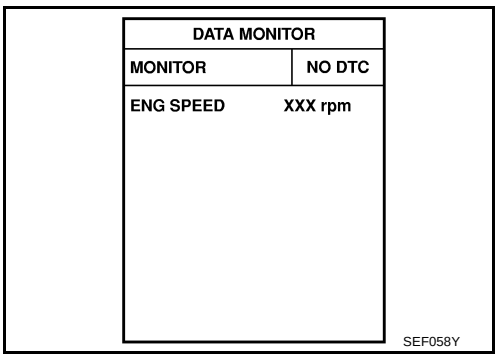
EBS0016W

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 wait at least 8 seconds.
4. If 1st trip DTC is detected, go to EC-369, "Diagnostic Procedure"
.



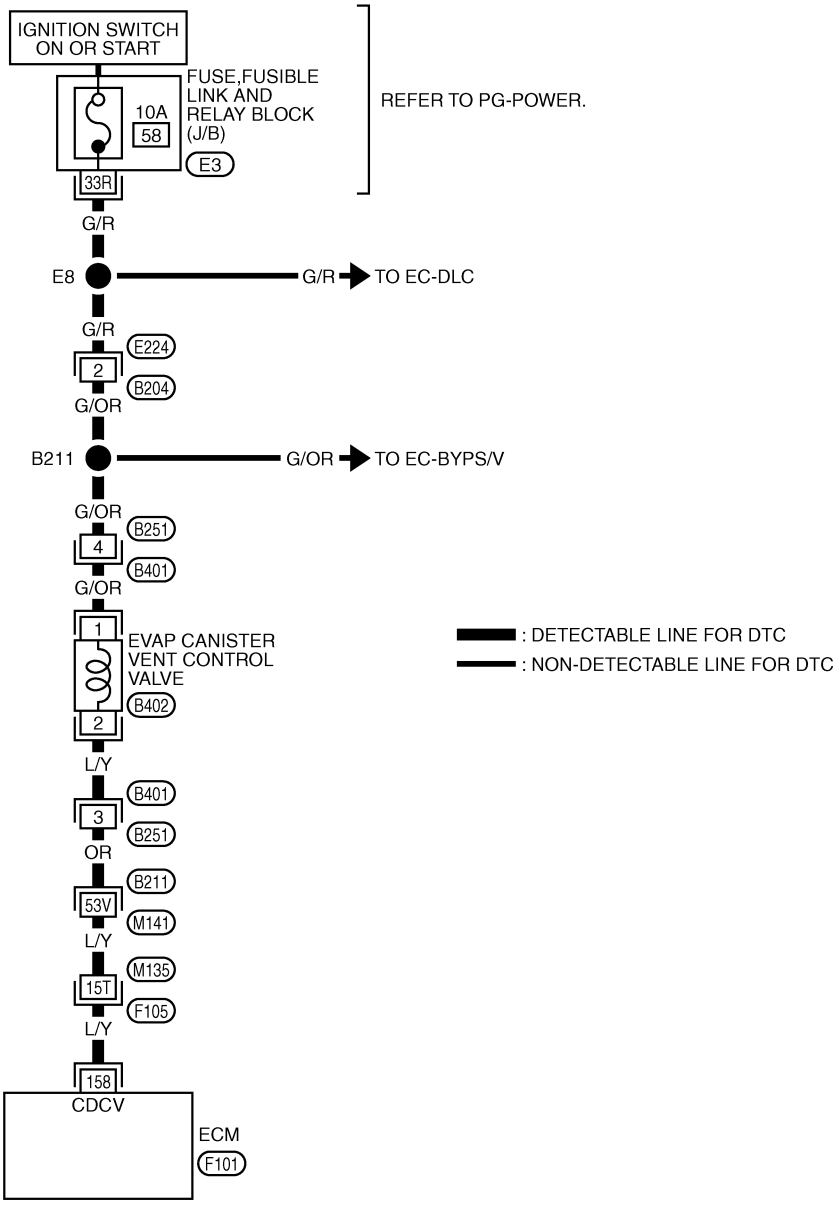
WITH GST

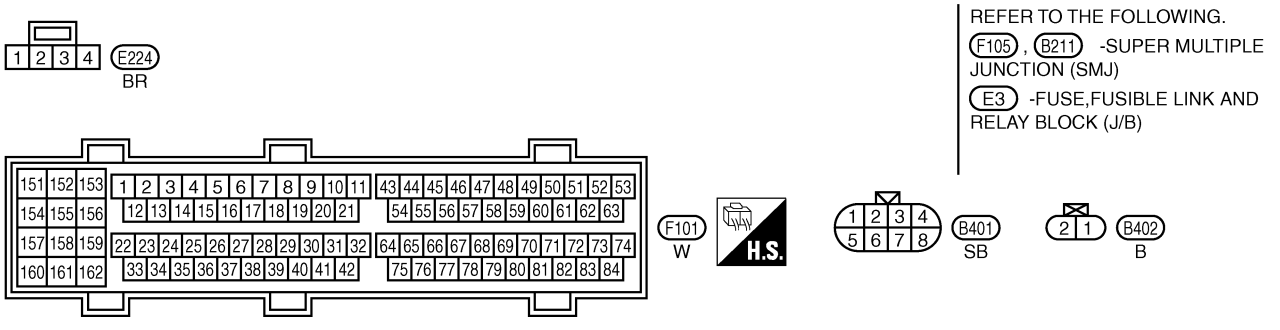
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0016X

EC-VENT/V-01





REFER TO THE FOLLOWING.
F105 , B211 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0025E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
158	L/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS0016Y

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF" and then turn "ON".
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V

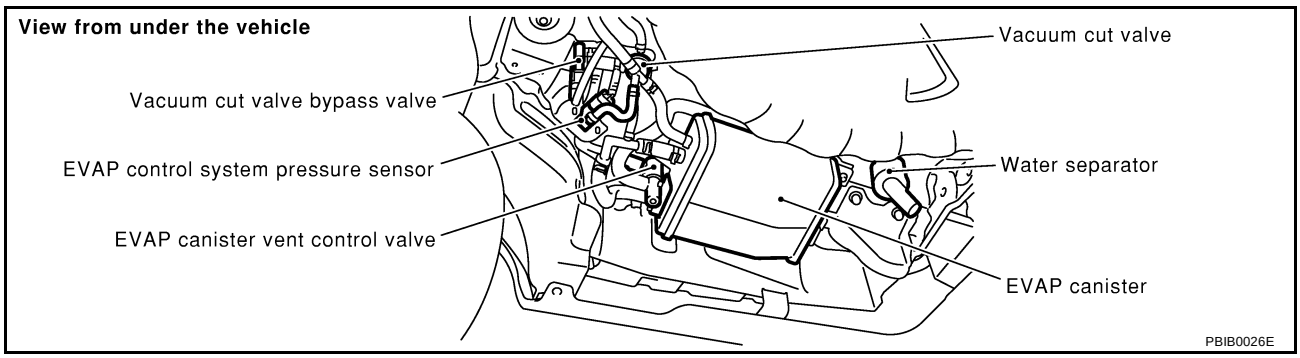
PBIB0151E

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

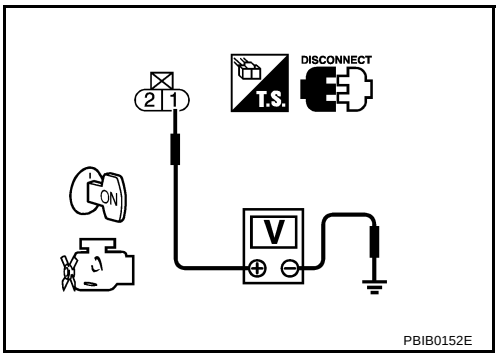
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister vent control valve harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister vent control valve 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 B251, B401
- Harness connectors E224, B204
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

>> Repair harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 158 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B251, B401
- Harness connectors B211, M141
- Harness connectors M135, F105
- Harness for open or short between EVAP canister vent control valve and ECM

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

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-371, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

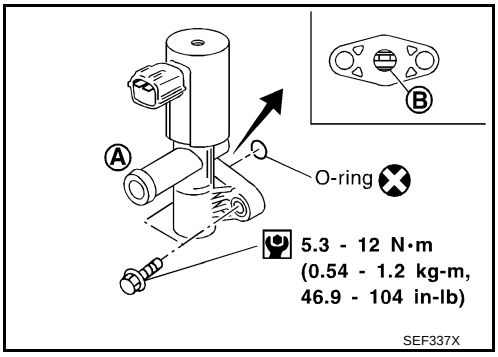
Component Inspection

EBS0016Z

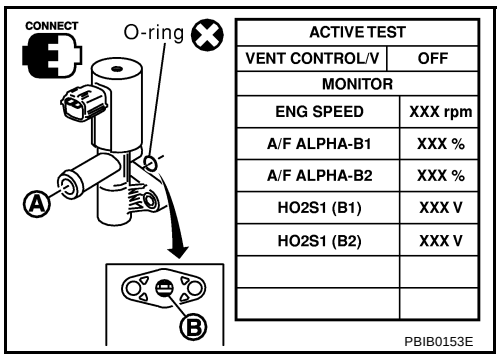
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.
5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

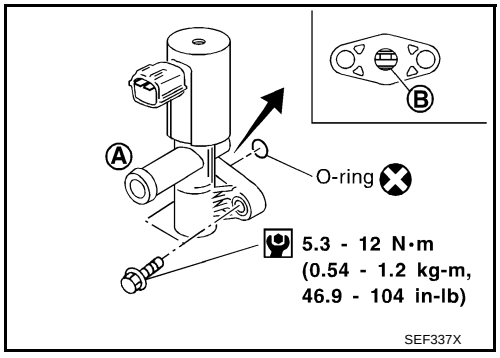


6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 9 again.

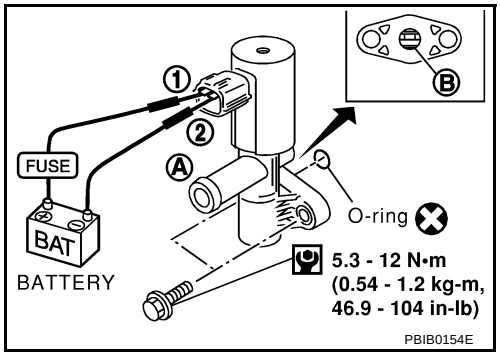


⊗ Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 9 again.



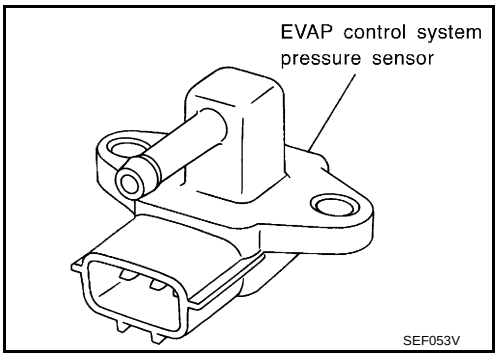
DTC P0450 EVAP CONTROL SYSTEM PRESSURE SENSOR

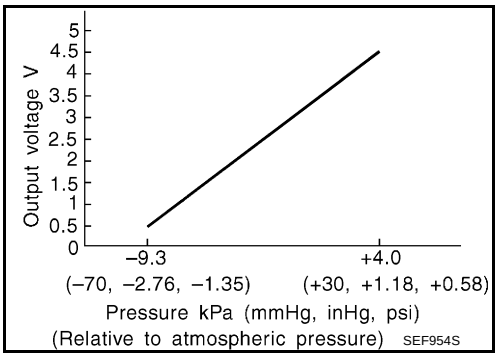
PFP:25085

Component Description

EBS00171

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

EBS00172

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

EBS00173

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

EBS00174

- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

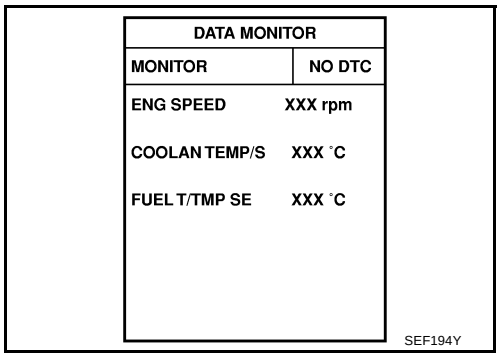
DTC Confirmation Procedure

EBS00175

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 test at a temperature of 5°C (41°F) or more.

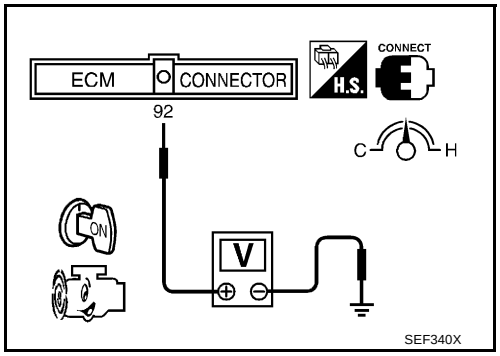
WITH CONSULT-II

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. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to EC-376, "Diagnostic Procedure" .



WITH GST

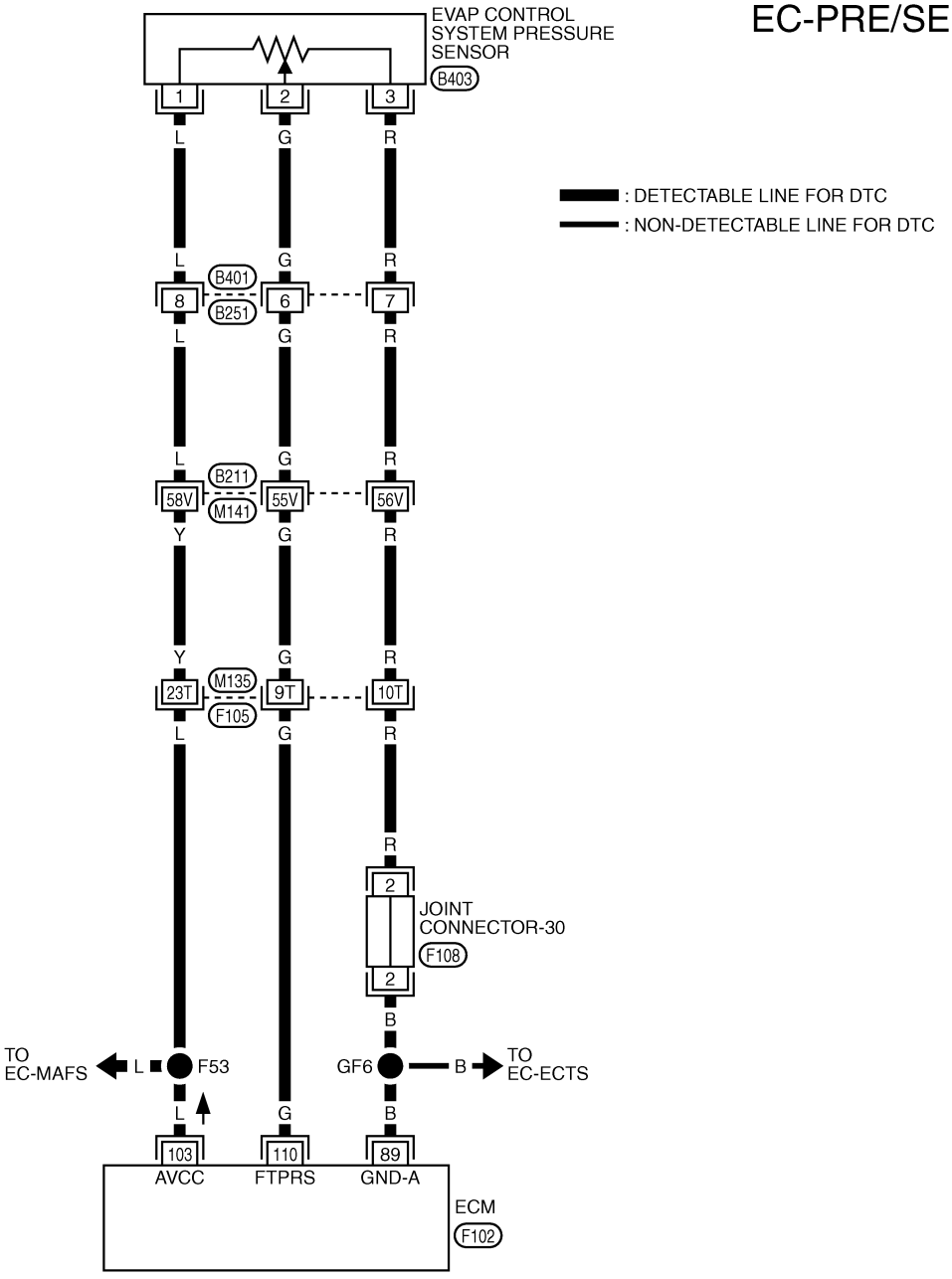
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 92 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select “MODE 7” with GST.
6. If 1st trip DTC is detected, go to EC-376, "Diagnostic Procedure" .

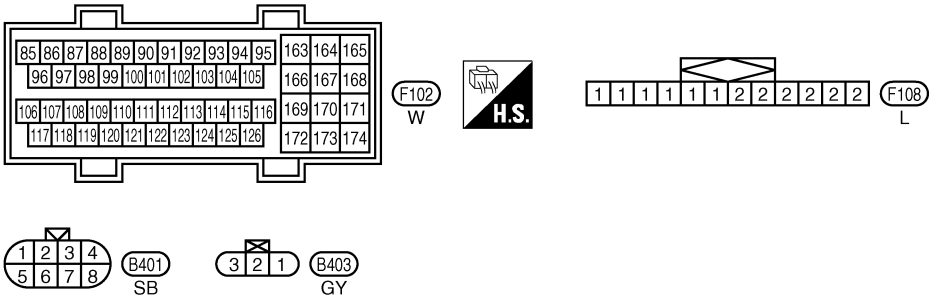


Wiring Diagram

EBS00176

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F105 , B211 -SUPER MULTIPLE JUNCTION (SMJ)

TBWM0026E

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

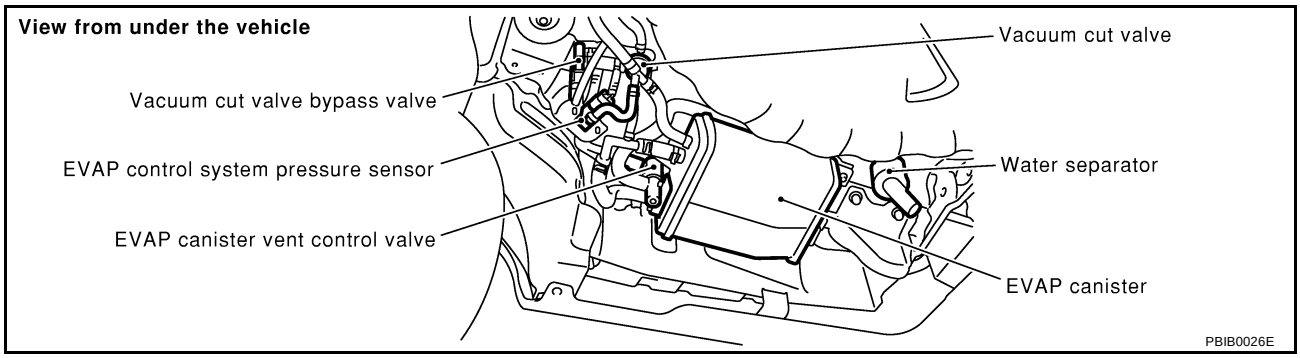
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
110	G	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V

Diagnostic Procedure

EBS00177

1. CHECK RUBBER TUBE

1. Turn ignition switch "OFF".
2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.



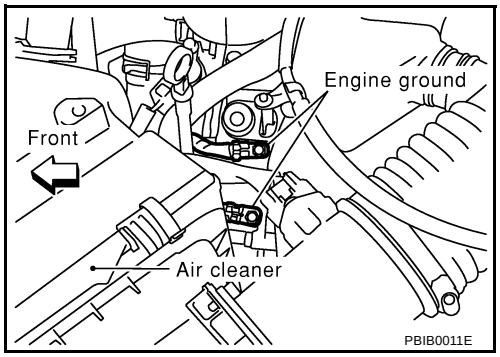
OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

2. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 3.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

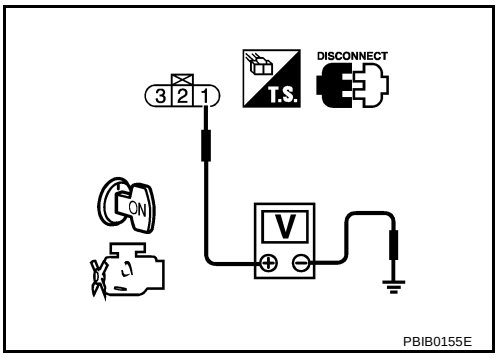
OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness connector.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between EVAP control system pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B401, B251
- Harness connectors B211, M141
- Harness connectors M135, F105
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between EVAP control system pressure sensor terminal 3 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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B401, B251
- Harness connectors B211, M141
- Harness connectors M135, F105
- Joint connector-30
- Harness for open or short between EVAP control system pressure sensor and ECM

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

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK (With CONSULT-II)>>GO TO 10.
OK (Without CONSULT-II)>>GO TO 11.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B401, B251
- Harness connectors B211, M141
- Harness connectors M135, F105
- Harness for open or short between ECM and EVAP control system pressure sensor

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

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB0147E

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-365, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister purge volume control solenoid valve.

12. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 13.
NG >> Clean the rubber tube using an air blower.

13. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-371, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-380, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP control system pressure sensor.

15. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 16.
NG >> Clean rubber tube using an air blower, repair or replace rubber tube.

16. CHECK WATER SEPARATOR

Refer to EC-359, "Component Inspection" .

OK or NG

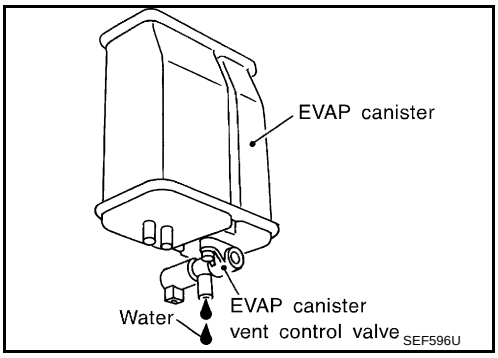
OK >> GO TO 17.
NG >> Replace water separator.

17. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 18.
No >> GO TO 20.



18. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 20.
NG >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

20. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

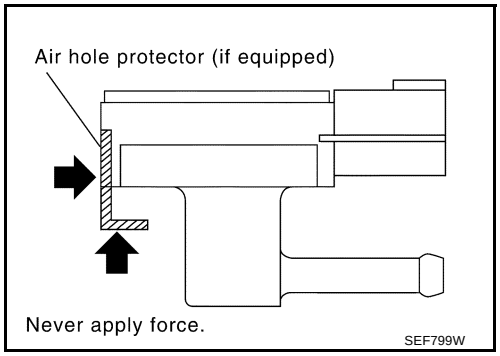
Component Inspection

EBS00D35

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

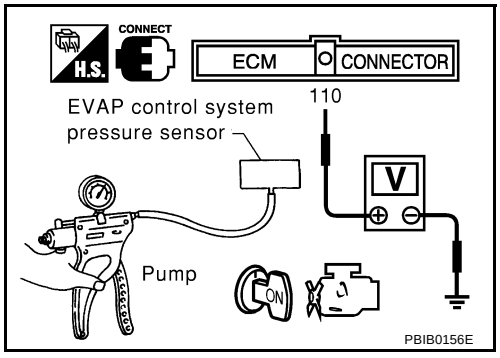
   CAUTION:
   Never apply force to the air hole protector of the sensor if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch “ON”.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check voltage between ECM terminal 110 and ground with CONSULT-II or tester.



Pressure (Relative to atmospheric pressure	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

CAUTION:
Discard any EVAP control system pressure sensor which has dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such a concrete floor; use a new one.

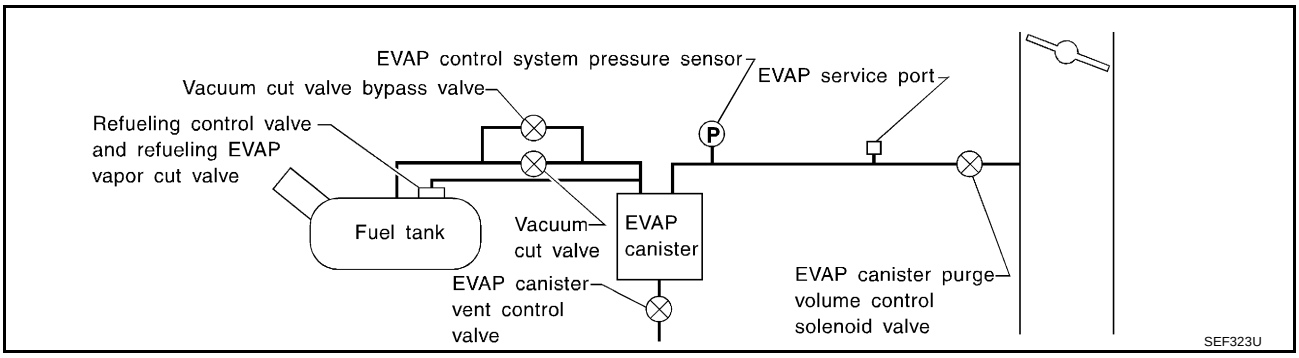
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

PFP:14950

On Board Diagnosis Logic

EBS0017A

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-522 .)
This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

EBS0017B

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

EBS0017C

CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:
- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-522 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

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

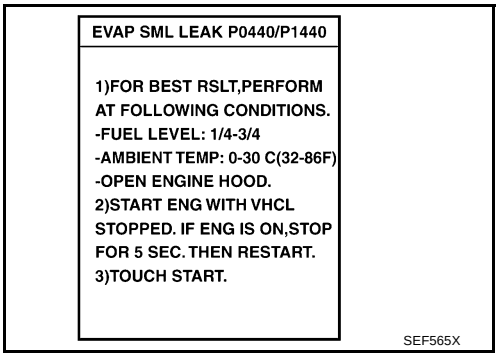
TESTING CONDITION:

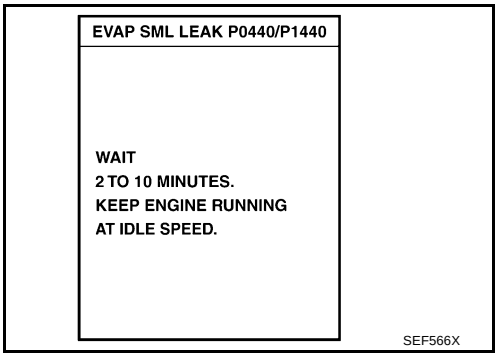
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

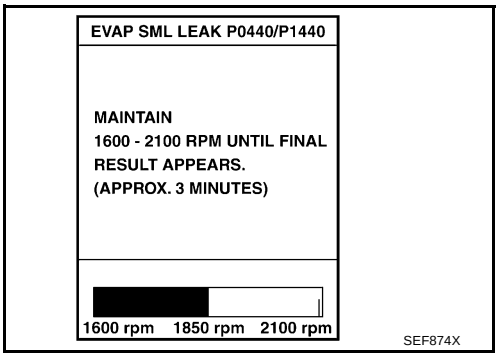
WITH CONSULT-II

1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch “ON”.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

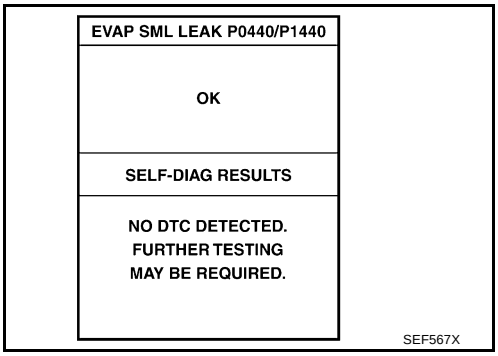
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-82, "Basic Inspection" .







7. Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-383, "Diagnostic Procedure" .
If P0440 is displayed, perform “Diagnostic Procedure” for DTC P0440, EC-352 .



WITH GST

NOTE:
Be sure to read the explanation of “Driving Pattern” on EC-61 before driving vehicle.

1. Start engine.
2. Drive vehicle according to “Driving Pattern”, EC-61 .
3. Stop vehicle.
4. Select “MODE 1” with GST.

– If SRT of EVAP system is not set yet, go to the following step.
– If SRT of EVAP system is set, the result will be OK.

5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine.
It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the “Driving Pattern”, EC-61 .
8. Stop vehicle.
9. Select “MODE 3” with GST.

– If P0455 is displayed on the screen, go to EC-383, "Diagnostic Procedure" .
– If P0440 or P1440 is displayed on the screen, go to “Diagnostic Procedure”, for DTC P0440, EC-352 .
– If P1447 is displayed on the screen, go to “Diagnostic Procedure” for DTC P1447, EC-518 .
– If P0455, P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10. Select “MODE 1” with GST.

– If SRT of EVAP system is set, the result will be OK.
– If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

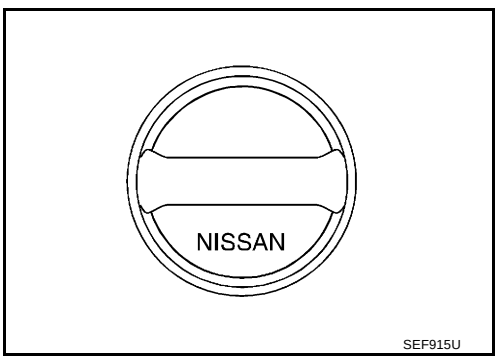
EBS0017D

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
● Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-609, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to “DTC Confirmation Procedure”, EC-366 .

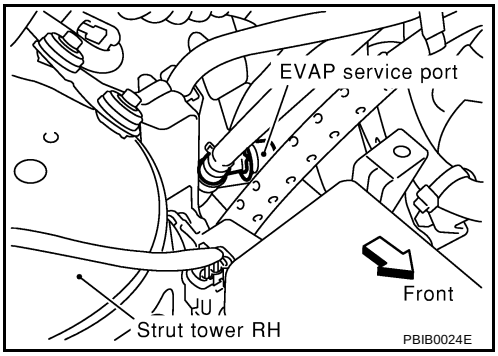
OK or NG

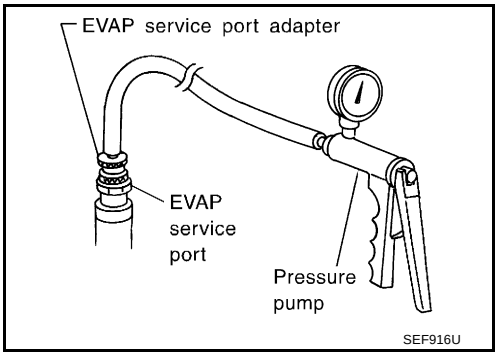
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





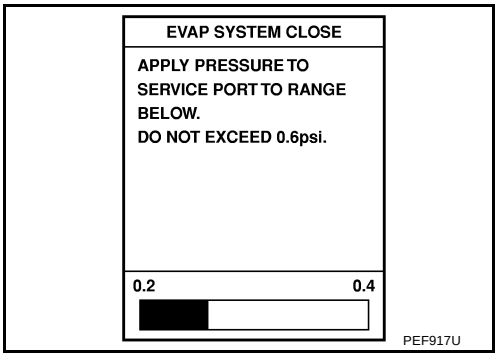
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

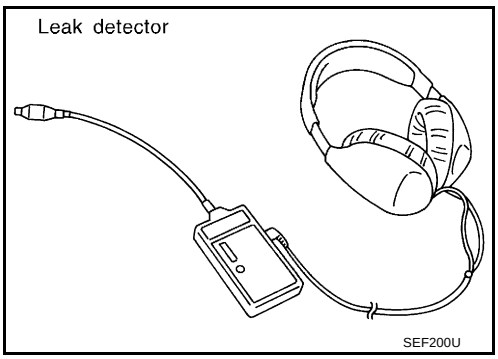
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING"
   .

OK or NG

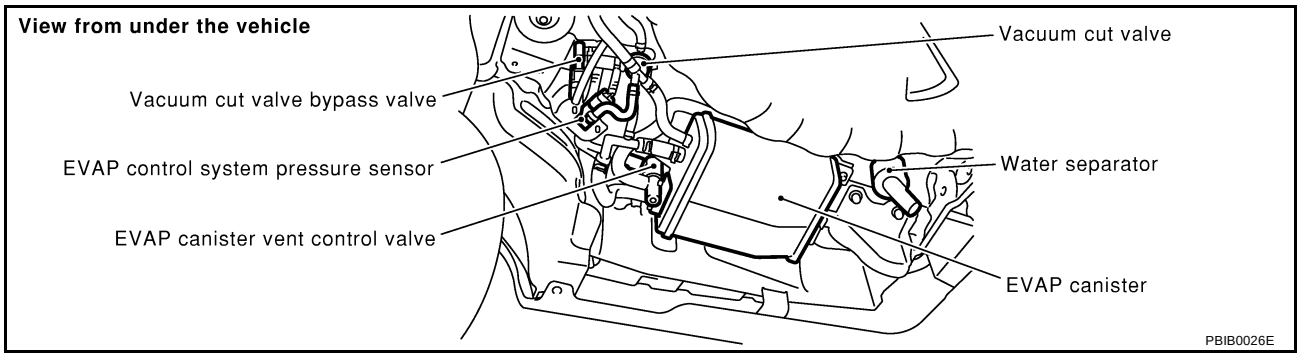
OK >> GO TO 11.
NG >> Repair or replace.



10. CHECK FOR EVAP LEAK

Without CONSULT-II

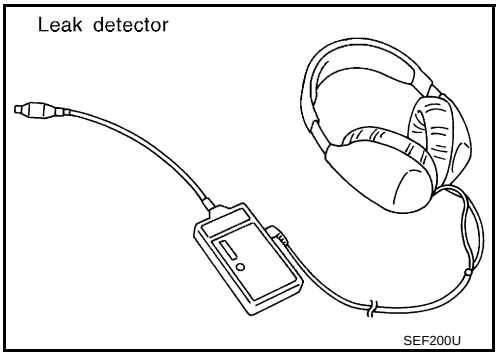
1. Turn ignition switch “OFF”.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-607, "EVAPORATIVE EMISSION LINE DRAWING" .



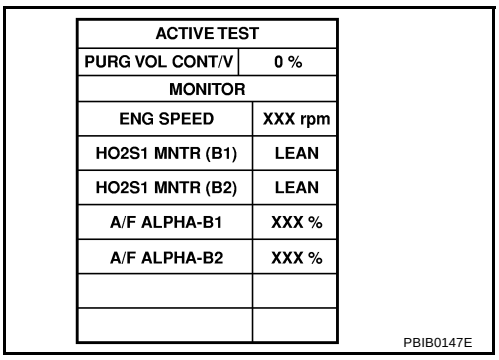
OK or NG

OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-24, "Vacuum Hose Drawing" .

OK or NG

OK (With CONSULT-II)>>GO TO 14.
OK (Without CONSULT-II)>>GO TO 15.
NG >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. 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 16.
NG >> GO TO 15.

ACTIVE TEST	
PURG VOL CONT/V	0 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB0147E

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-365, "EVAP CANISTER PURGE CONTROL SOLENOID VALVE" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK ABSOLUTE PRESSURE SENSOR

Refer to EC-167, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace absolute pressure sensor.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-320, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-380, "Component Inspection" .

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK REFUELING EVAP VAPOR LINE

Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-612, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hoses and tubes.

20. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses, tubes or filler neck tube.

21. CHECK REFUELING CONTROL VALVE

Refer to EC-616, "Component Inspection" .

OK or NG

OK >> GO TO 22.
NG >> Replace refueling control valve with fuel tank.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

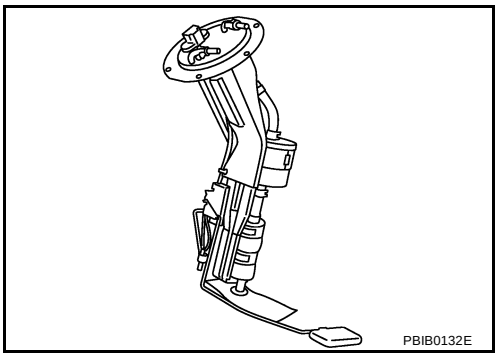
DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

PFP:25060

Component Description

EBS0017E

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

EBS0017F

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.
Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

EBS0017G

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

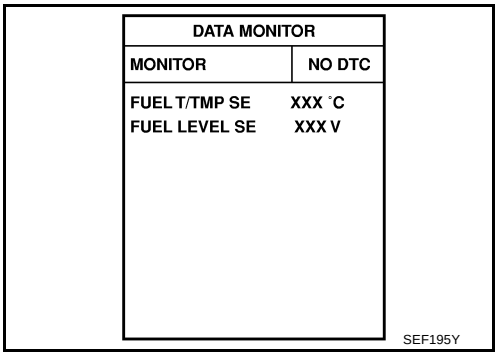
DTC Confirmation Procedure

EBS0017H

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 maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to EC-391, "Diagnostic Procedure"
   .



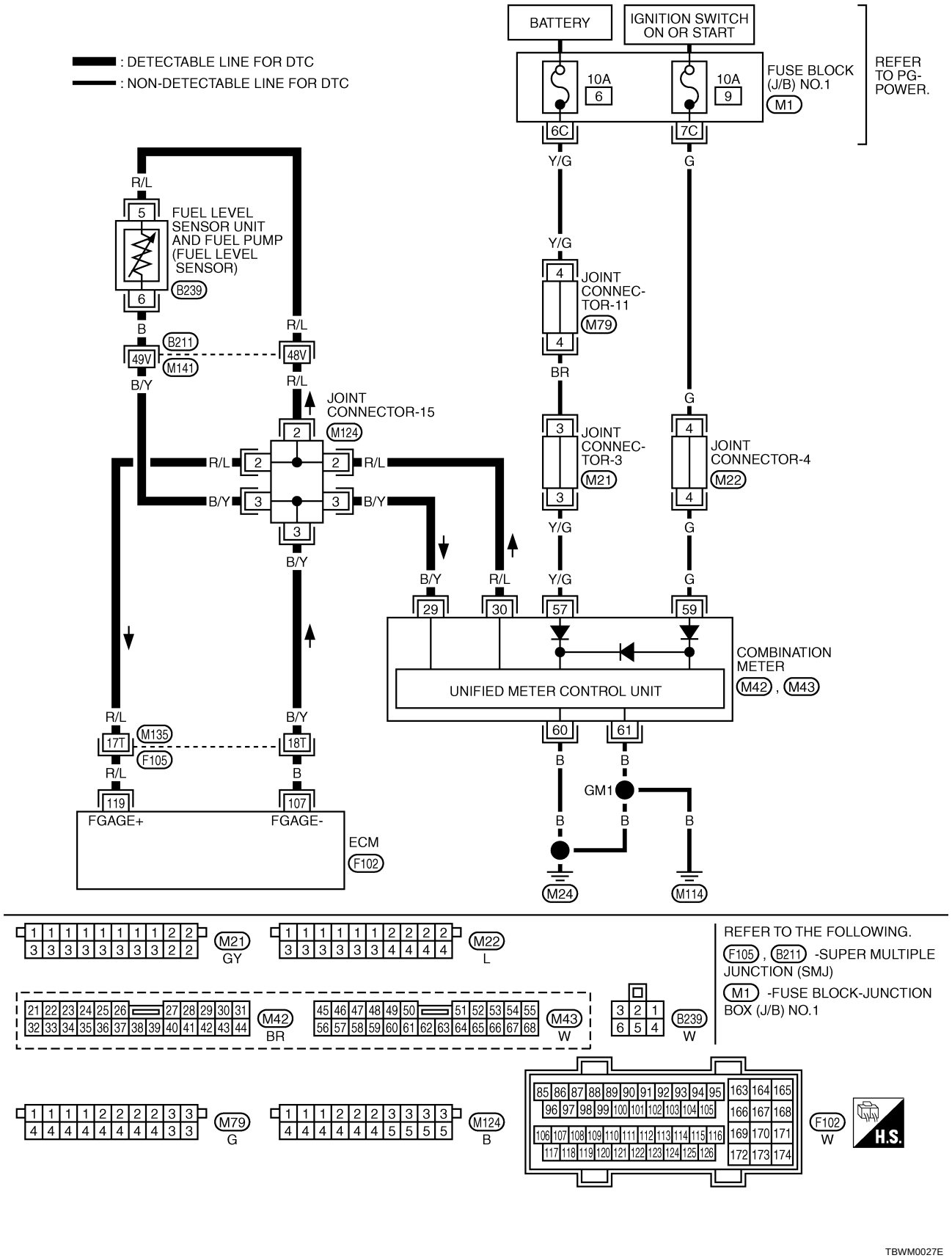
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0017I

EC-FLS1-01



TBWM0027E

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

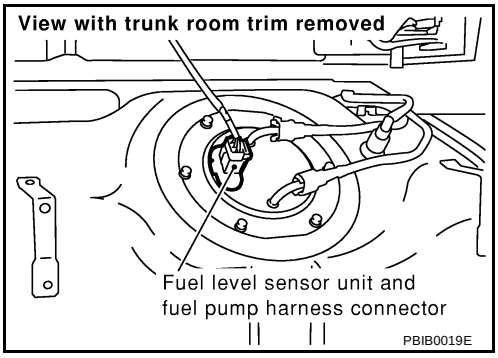
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
107	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
119	R/L	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

EBS0017J

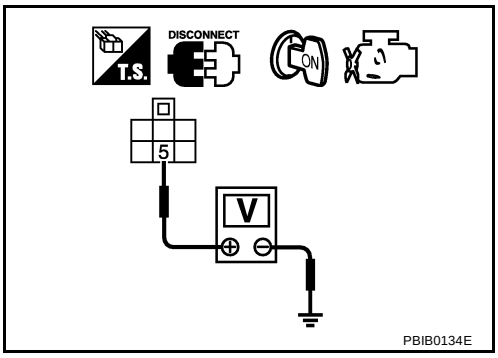
1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch "ON".



4. Check voltage between fuel level sensor unit and fuel pump terminal 5 and ground with CONSULT-II or a tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M141, B211
- Joint connector-15
- Harness for open or short between combination meter and fuel level sensor unit and fuel pump

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

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect combination meter harness connectors.
3. Check harness continuity between fuel level sensor unit and fuel pump terminal 6 and combination meter 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M141, B211
- Joint connector-15
- Harness for open or short between combination meter and fuel level sensor unit and fuel pump

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

5. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 119 and fuel level sensor unit and fuel pump terminal 5, ECM terminal 107 and fuel level sensor unit and fuel pump terminal 6. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M135, F105
- Joint connector-15
- Harness for open or short between ECM and fuel level sensor and fuel pump

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

7. CHECK FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Remove and Installation

EBS0017K

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

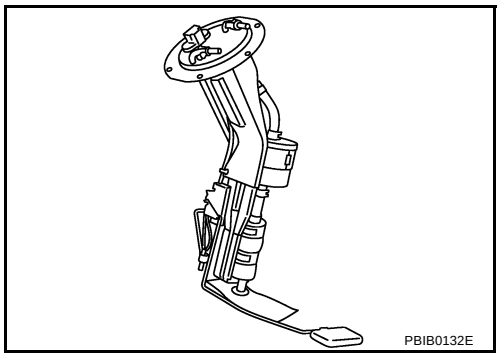
DTC P0461 FUEL LEVEL SENSOR FUNCTION

PFP:25060

Component Description

EBS0017L

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.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On Board Diagnosis Logic

EBS0017M

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.
Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

EBS0017N

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

EBS0017O

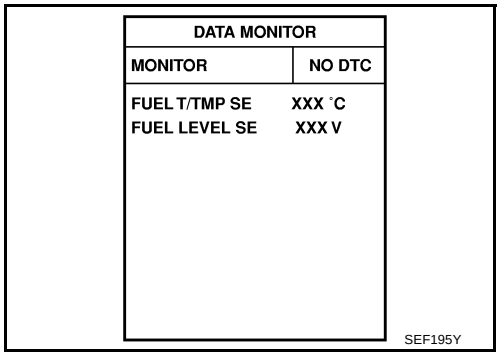
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-6, "FUEL TANK" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-48, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF” and wait at least 10 seconds then turn “ON”.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check “FUEL LEVEL SE” output voltage and note it.
12. Check “FUEL LEVEL SE” output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.



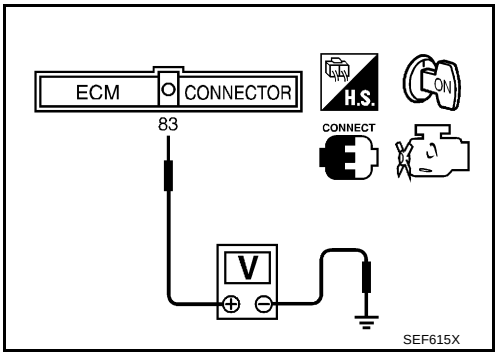
SEF195Y

If NG, check the fuel level sensor, refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

WITH GST

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-48, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch “OFF”.
6. Set voltmeters probe between ECM terminal 83 (fuel level sensor signal) and ground.
7. Turn ignition switch “ON”.
8. Check voltage between ECM terminal 83 and ground and note it.
9. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Confirm that the voltage between ECM terminal 83 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .



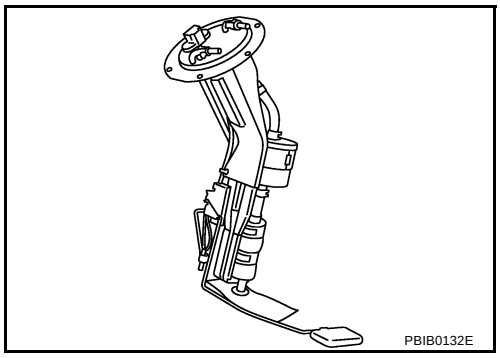
DTC P0464 FUEL LEVEL SENSOR CIRCUIT

PFP:25060

Component Description

EBS0017P

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

EBS0017Q

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.
Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

Possible Cause

EBS0017R

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

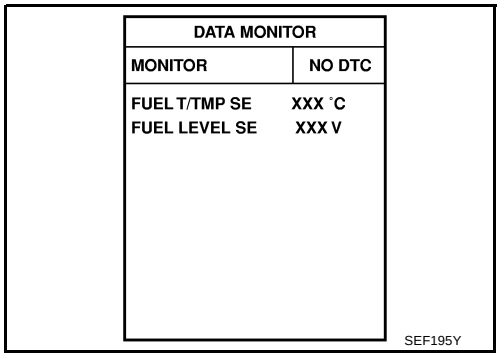
DTC Confirmation Procedure

EBS0017S

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 ignition switch “ON”.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-398, "Diagnostic Procedure"
   .



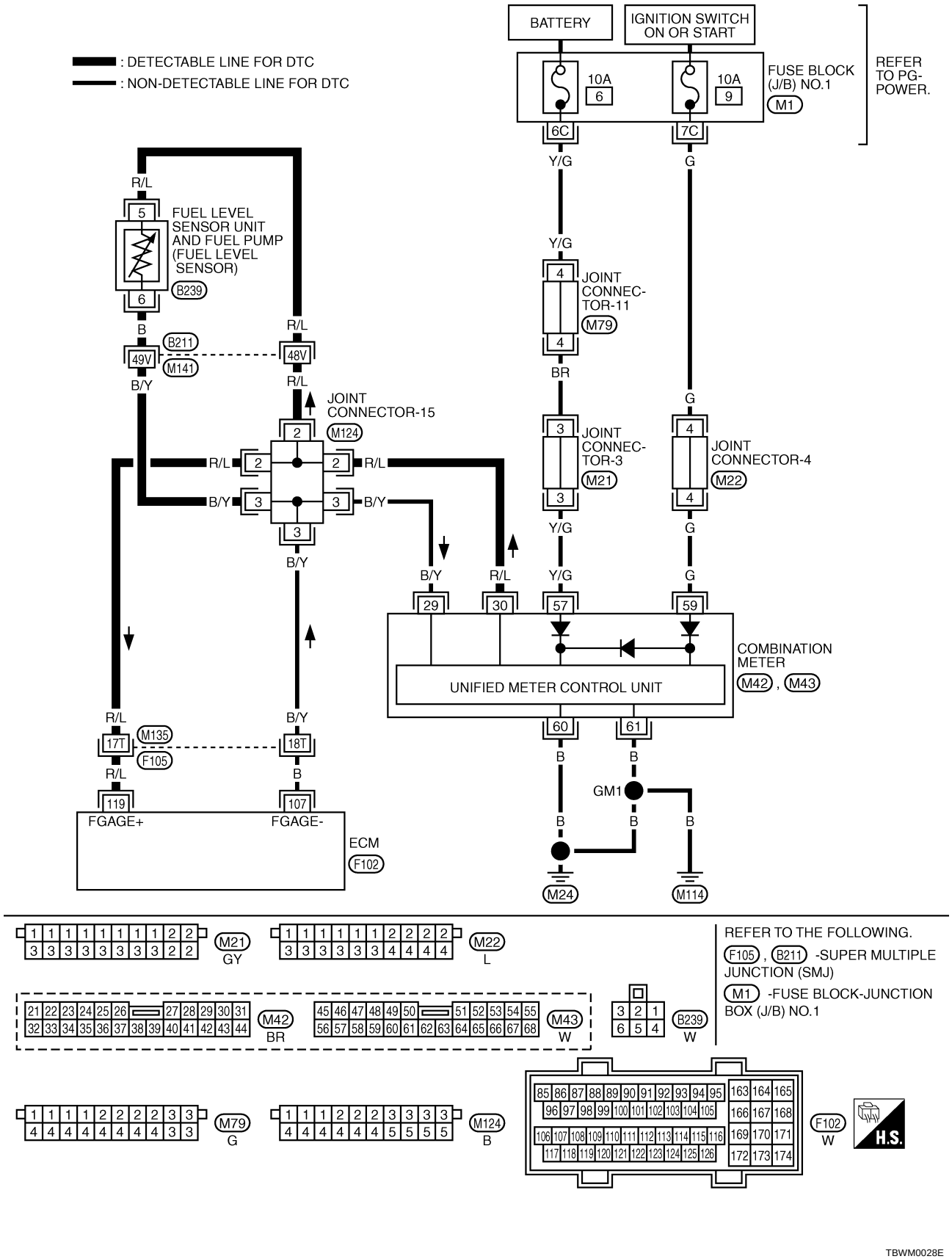
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0017T

EC-FLS2-01



TBWM0028E

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

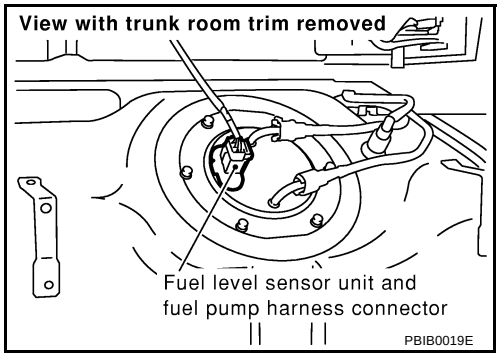
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
107	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
119	R/L	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

EBS0017U

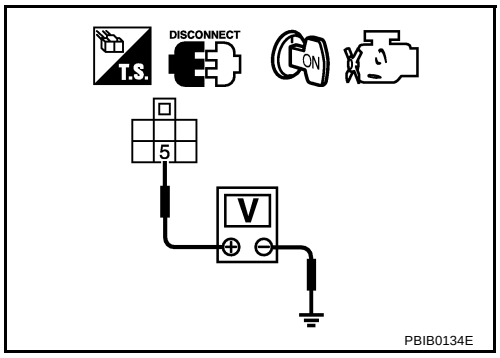
1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch "ON".



4. Check voltage between fuel level sensor unit and fuel pump terminal 5 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 M141, B211
- Harness connector-15
- Harness for open or short between combination meter and fuel level sensor unit and fuel pump

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

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 107 and fuel level sensor unit and fuel pump terminal 6. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M141, B211
- Harness connector-15
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

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

5. CHECK FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel level sensor unit.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

EBS0017V

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P0500 VEHICLE SPEED SENSOR (VSS)

PFP:32702

Description

EBS0017W

NOTE:
If DTC P0500 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-151, "DTC U1000 CAN COMMUNICATION LINE" .
The vehicle speed signal is sent to the combination meter from the VDC/TCS/ABS control unit by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

On Board Diagnosis Logic

EBS0017X

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.

Possible Cause

EBS0017Y

- Harness or connector
  (The CAN communication line is open or shorted.)
- VDC/TCS/ABS control unit
- Wheel sensors
- Combination meter

DTC Confirmation Procedure

EBS0017Z

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.

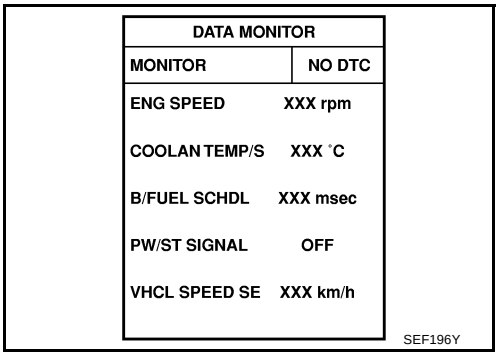
TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (TCS switch “OFF”).
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-401, "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	1,400 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.5 - 31.9 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6. If 1st trip DTC is detected, go to EC-401, "Diagnostic Procedure" .



Overall Function Check

EBS00180

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-401, "Diagnostic Procedure" .

Diagnostic Procedure

EBS00182

1. CHECK DTC WITH VDC/TCS/ABS CONTROL UNIT

Check DTC with VDC/TCS/ABS control unit.
Refer to BRC-11, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-5, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0505 IDLE SPEED CONTROL (ISC) SYSTEM

PFP:23781

Description

EBS004VR

NOTE:
If DTC P0505 is displayed with DTC P0120, P1122 or P1123, first perform the trouble diagnosis for the DTC P0120, P1122, P1123. Refer to EC-178 , EC-443 , EC-447 .

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

EBS004VS

Malfunction is detected when the idle speed is not in the specified range.

Possible Cause

EBS004VT

- Electric throttle control actuator
- Intake air leak

DTC Confirmation Procedure

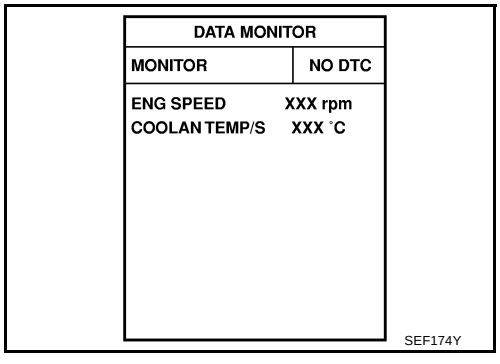
EBS004VU

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.
- **If the target idle speed is out of the specified value, perform “Idle Air Volume Learning”, EC-45 , before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the “Service Data and Specifications (SDS)”, EC-621 .**

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

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Turn ignition switch “ON” again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-403 .



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

EBS004VV

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. REPLACE ECM

1. Stop engine.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

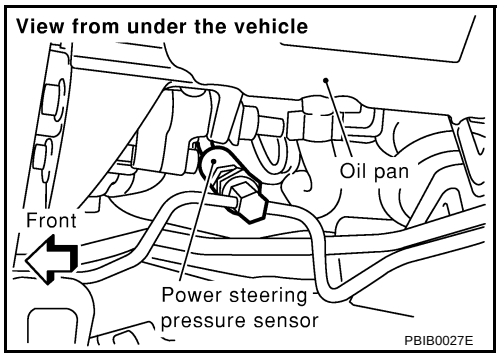
DTC P0550 POWER STEERING PRESSURE (PSP) SENSOR

PFP:49763

Component Description

EBS002KF

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the ETC actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

EBS002KG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

On Board Diagnosis Logic

EBS002WH

Malfunction is detected when an excessively low or high voltage from the power steering pressure sensor is sent to ECM.

Possible Cause

EBS002WI

- Harness or connectors
  (Power steering pressure sensor circuit is open or shorted)
- Power steering pressure sensor

DTC Confirmation Procedure

EBS002WJ

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 at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-406, "Diagnostic Procedure" .

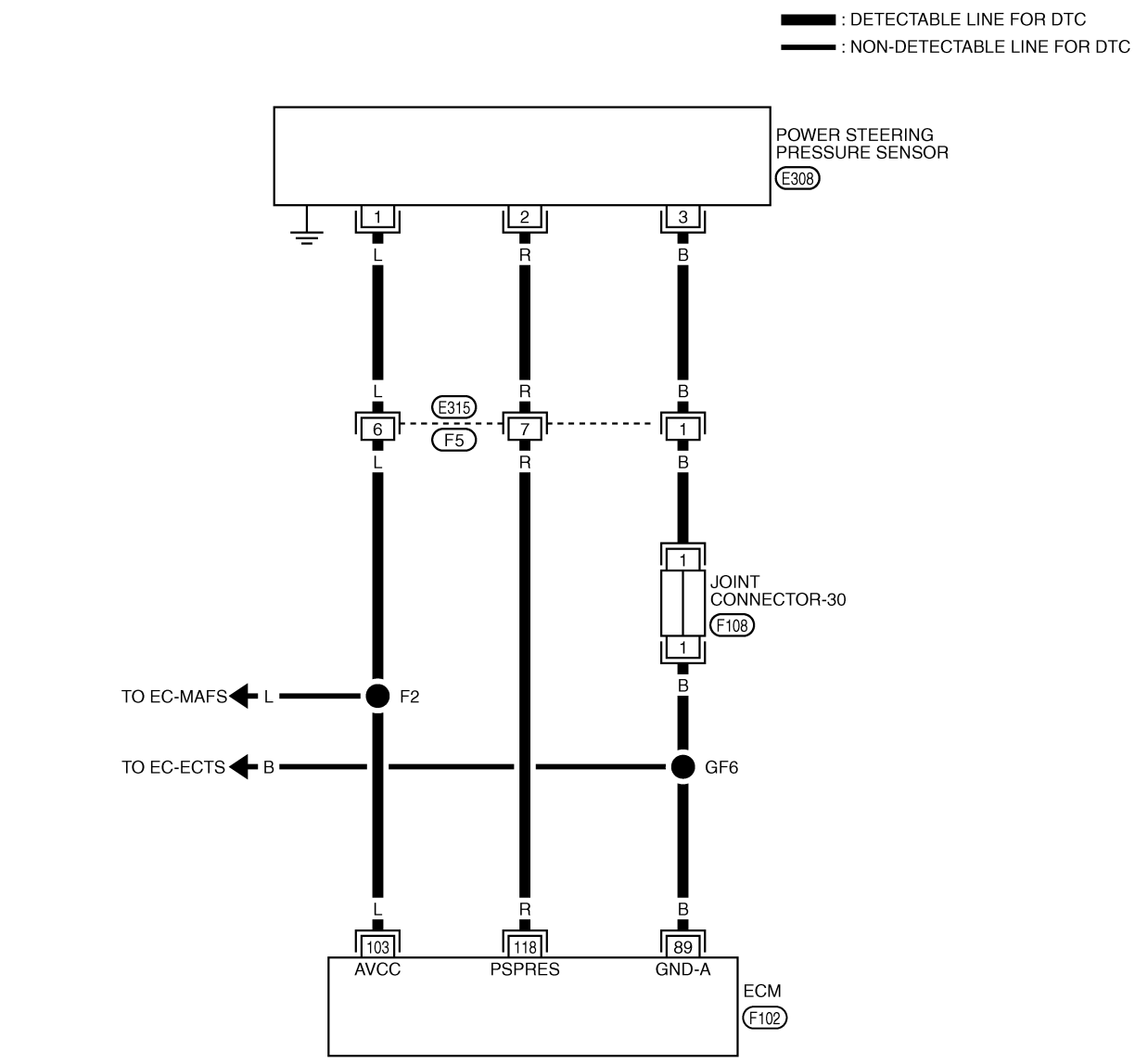
WITH GST

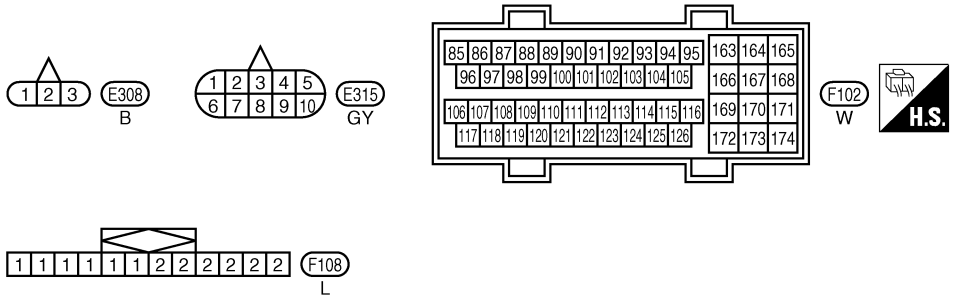
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002KH

EC-PS/SEN-01





TBWM0118E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
103	L	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
118	R	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V

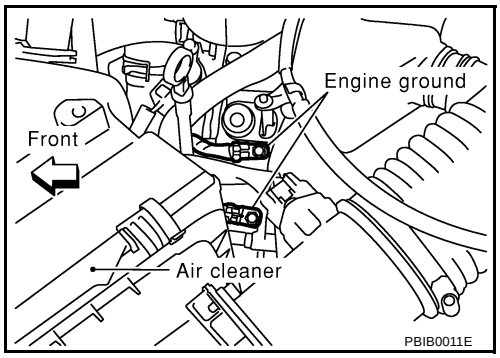
Diagnostic Procedure

EBS002KI

1. RETIGHTEN GROUND SCREWS

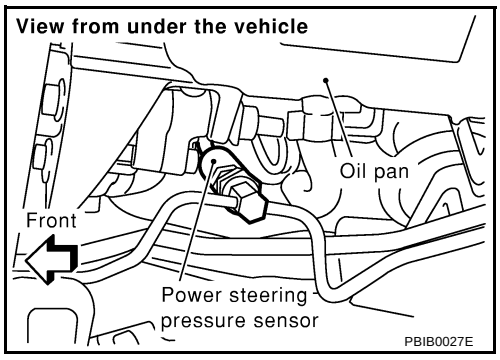
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK POWER STEERING PRESSURE (PSP) SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.
2. Turn ignition switch "ON".

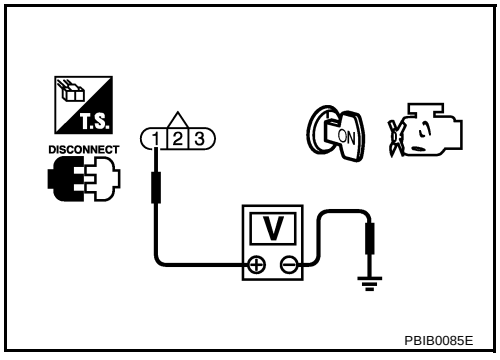


3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Harness for open or short between ECM and PSP sensor

>> Repair harness or connectors.

4. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between PSP sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F5, E315
- Joint connector-30
- Harness for open or short between ECM and PSP sensor

>> Repair harness or connectors.

6. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 118 and PSP sensor terminal 2.

Continuity should exist.

3. 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 F5, E315
- Harness for open or short between ECM and PSP sensor

>> Repair harness or connectors.

8. CHECK PSP SENSOR

Refer to EC-408, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace PSP sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

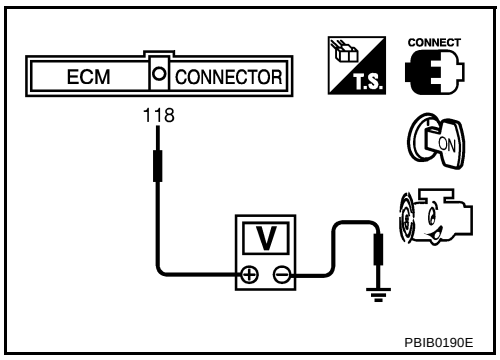
Component Inspection

EBS002KJ

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 118 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned fully.	Approximately 3.6V
Steering wheel is not being turned.	Approximately 0.6V



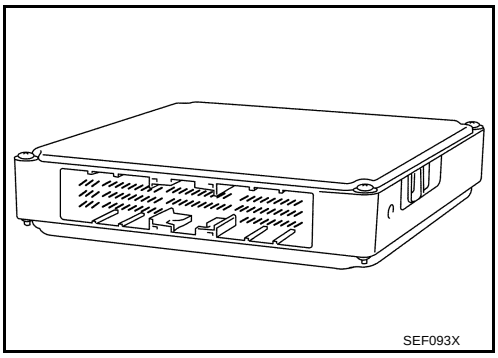
DTC P0605 ECM

PFP:23710

Component Description

EBS002WK

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


SEF093X

On Board Diagnosis Logic

EBS002WL

Malfunction is detected when
(Malfunction A) ECM calculation function is malfunctioning.
(Malfunction B) ECM EEP-ROM system is malfunctioning.
(Malfunction C) ECM self shut-off function is malfunctioning.

FAIL-SAFE MODE

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

Detected items	Engine operation condition in fail-safe mode
Malfunction A	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. When the accelerator pedal depressed value reaches a throttle opening of 30 degrees or more, the throttle valve opens to a maximum of 20 degrees by the accelerator wire.

Possible Cause

EBS002WM

- ECM

DTC Confirmation Procedure

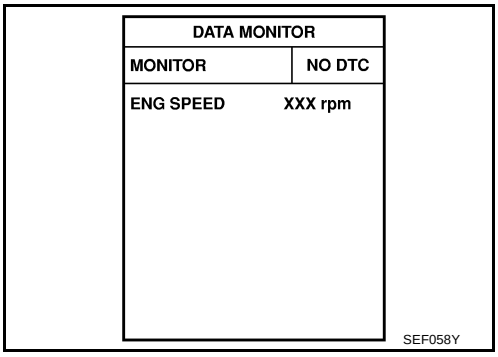
EBS002WN

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 1st trip DTC is detected, go to EC-411, "Diagnostic Procedure"
.



SEF058Y

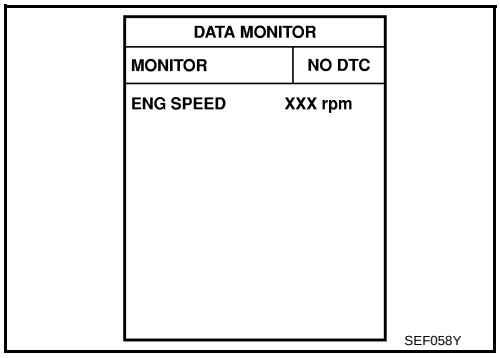
With GST

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-411, "Diagnostic Procedure" .



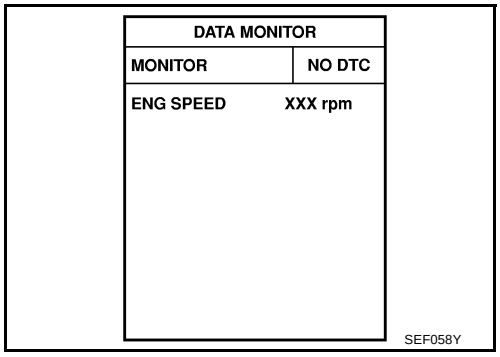
With GST

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 procedure, 32 times.
5. If 1st trip DTC is detected, go to EC-411, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

EBS002WO

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-409 .
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-409 .
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 IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .
3. Perform EC-45, "Throttle Valve Closed Position Learning" .
4. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P0650 MIL (CIRCUIT)

PFP:24810

Component Description

EBS002NM

Malfunction Indicator Lamp (MIL) is located on the instrument panel. When the ignition switch is turned ON without engine running, MIL will light up. This is a bulb check. When the engine is started, MIL should go off. If MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnosis Logic

EBS002NN

Malfunction is detected when
(Malfunction A) an excessively high voltage is sent to ECM through the MIL circuit under the condition that calls for MIL to light up,
(Malfunction B) an excessively low voltage is sent to ECM through the MIL circuit under the condition that calls for MIL not to light up.

FAIL-SAFE MODE

ECM enters in fail-safe mode when both DTC P0650 and another DTC, which calls for MIL to light up, are detected at the same time.

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

Possible Cause

EBS002NO

- Harness or connectors
  (MIL circuit is open or shorted)
- MIL

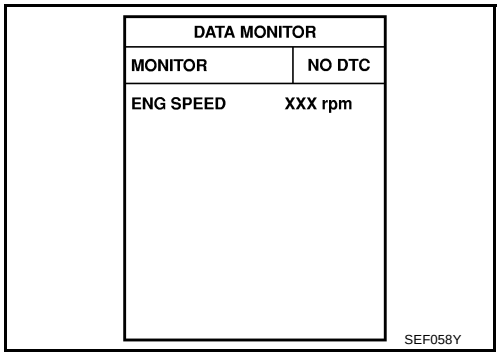
DTC Confirmation Procedure

EBS002NP

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. If DTC is detected, go to EC-414, "Diagnostic Procedure" .



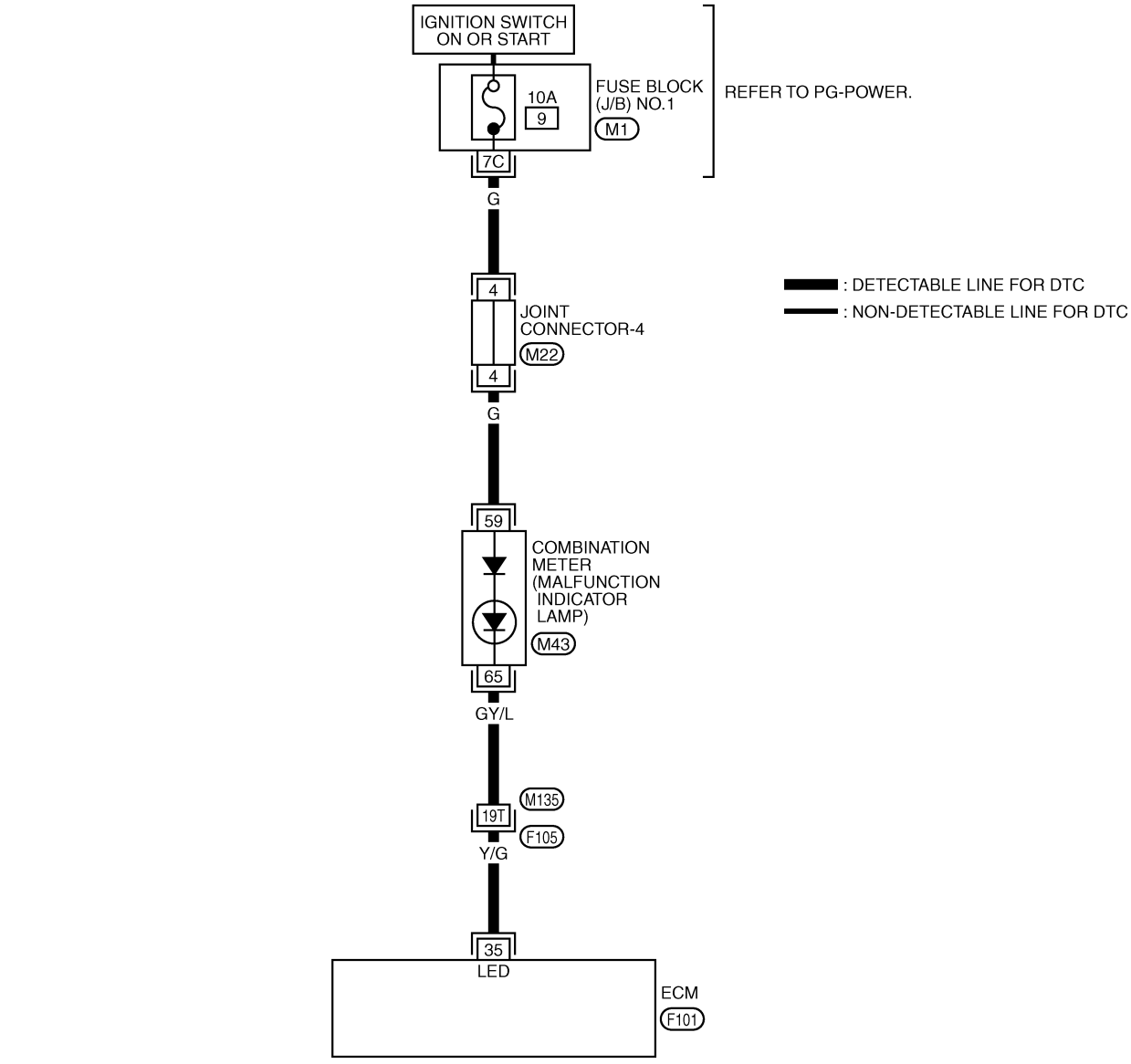
WITH GST

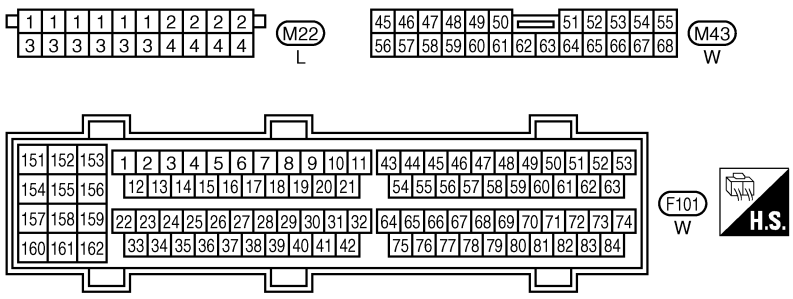
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002KL

EC-MIL-01





REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M1 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1

TBWM0104E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	Y/G	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

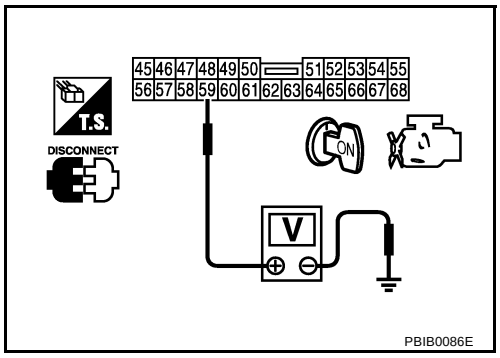
Diagnostic Procedure

EBS002NQ

1. CHECK MIL POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect combination meter harness connector.
3. Turn ignition switch "ON".
4. Check voltage between combination meter terminal 59 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.

- Joint connector-4
- Fuse block (J/B) No. 1 connector M1
- 10A fuse
- Harness for open or short between fuse block (J/B) No. 1 and combination meter

>> Repair harness or connectors.

3. CHECK MIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 35 and combination meter terminal 65. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Harness for open or short between ECM and combination meter

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace combination meter. Refer to DI-25, "Removal and Installation for Combination Meter" .

NG >> Repair or replace.

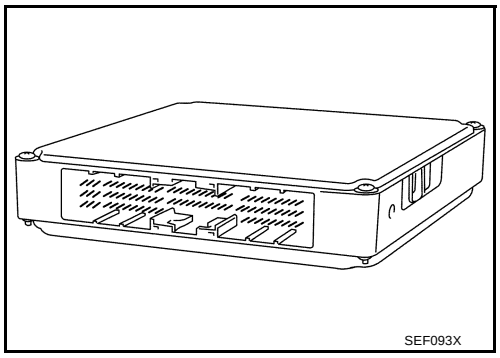
DTC P1065 ECM POWER SUPPLY (BACK UP)

PFP:23710

Component Description

EBS002KM

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.


SEF093X

On Board Diagnosis Logic

EBS002KN

Malfunction is detected when ECM back up RAM system does not function properly.

Possible Cause

EBS002KO

- Harness or connectors
  [ECM power supply (back up) circuit is open or shorted.]
- ECM

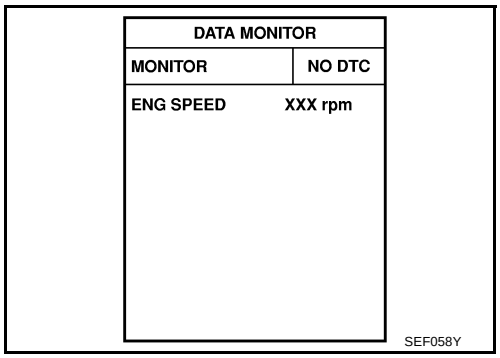
DTC Confirmation Procedure

EBS002KP

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-418, "Diagnostic Procedure"
   .



SEF058Y

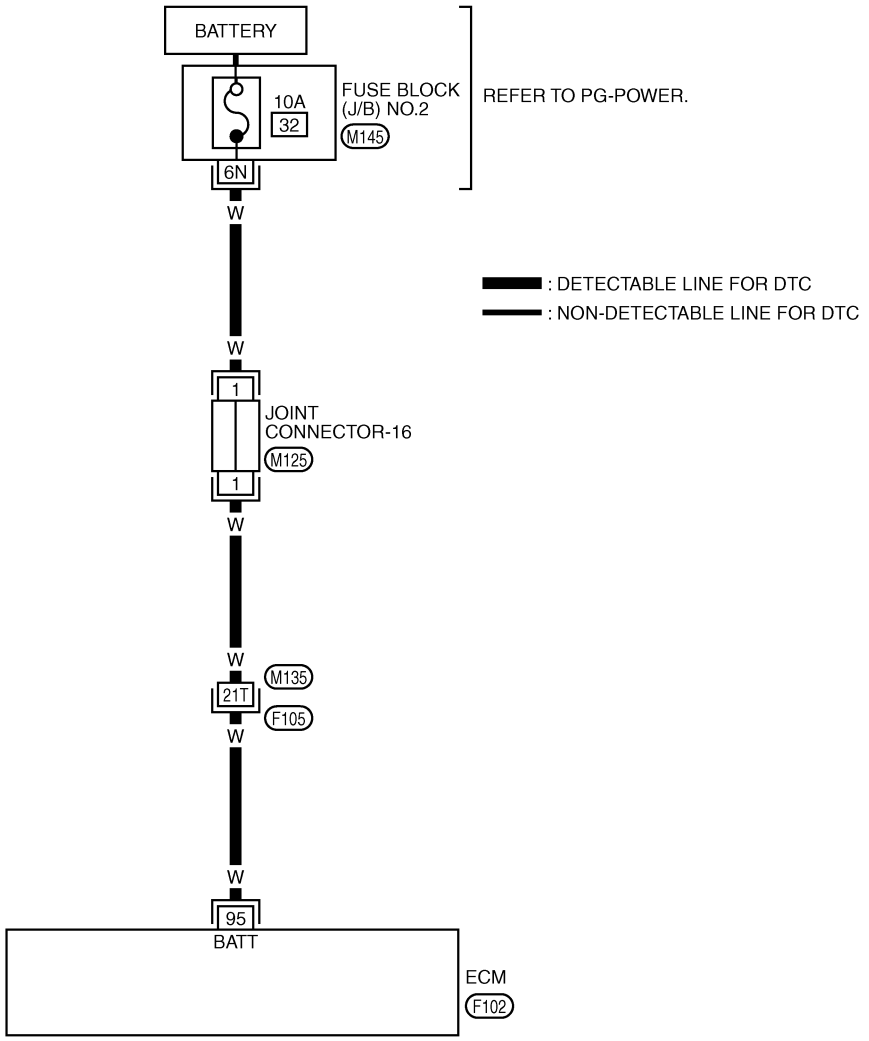
WITH GST

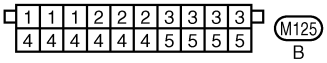
Follow the procedure “WITH CONSULT-II” above.

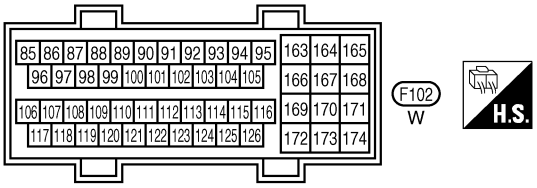
Wiring Diagram

EBS002OC

EC-ECM/PW-01







REFER TO THE FOLLOWING.
F105 -SUPER MULTIPLE JUNCTION (SMJ)
M145 -FUSE BLOCK-JUNCTION BOX (J/B) NO.2

TBWM0106E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Power supply for ECM (Buck-up)	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)

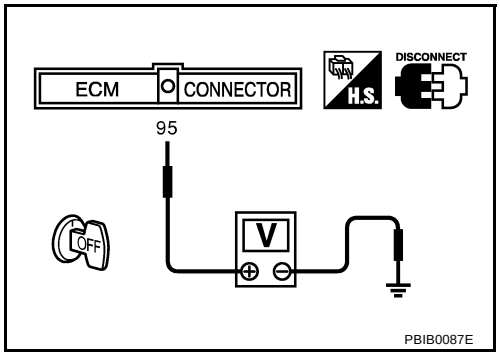
Diagnostic Procedure

EBS002KQ

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 95 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 F105, M135
- Joint connector-16
- Fuse block (J/B) No. 2 connector M145
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "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-416 .
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-416 .
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 IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .
3. Perform EC-45, "Throttle Valve Closed Position Learning" .
4. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1110 (BANK 1), P1135 (BANK 2) IVT CONTROL

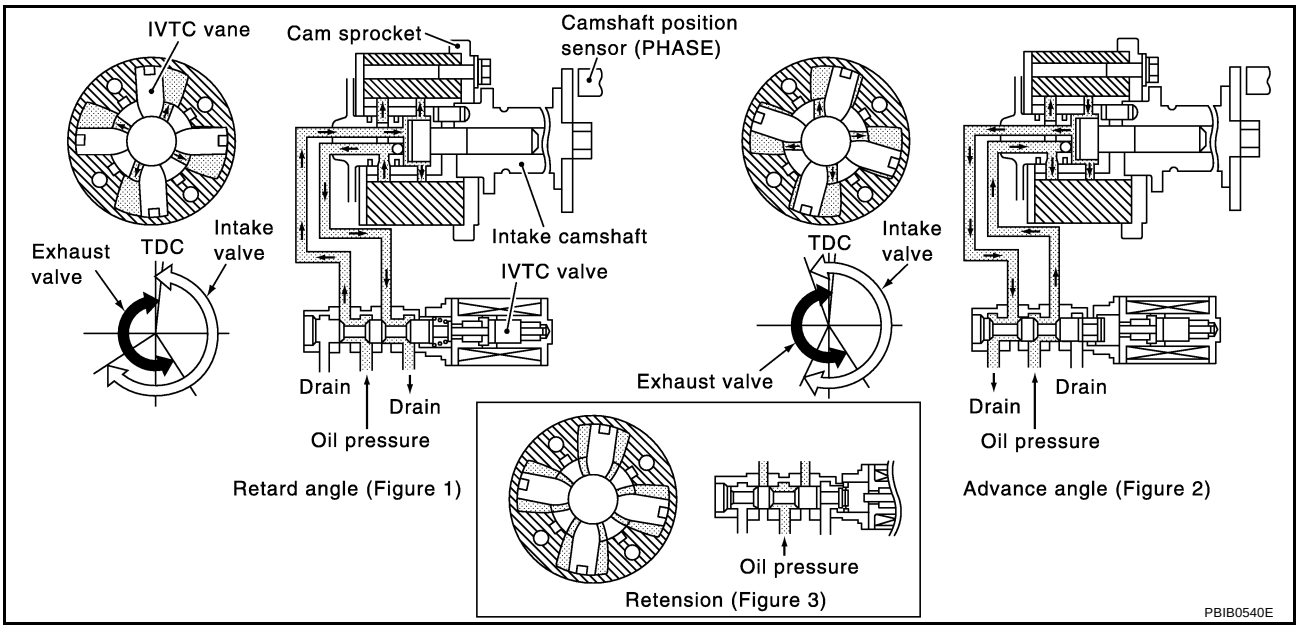
PFP:23796

Description

EBS002NT

SYSTEM DESCRIPTION

Sensor	Input signal to ECM function	ECM	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 sensor	Vehicle speed		



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

EBS002NU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 20°CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 50%

On Board Diagnosis Logic

EBS002NV

Malfunction is detected when
(Malfunction A) The alignment of the intake valve timing control has been misregistered,
(Malfunction B) There is a gap between angle of target and phase-control angle degree.

FAIL-SAFE MODE

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

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

Possible Cause

EBS002NW

MALFUNCTION A OR B

- Harness or connectors
  (Intake valve timing control position sensor circuit is open or shorted.)
- Intake valve timing control position sensor
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)
- Accumulation of debris to the signal pick-up portion of the camshaft

DTC Confirmation Procedure

EBS002NX

CAUTION:
Always drive at a safe speed.

NOTE:

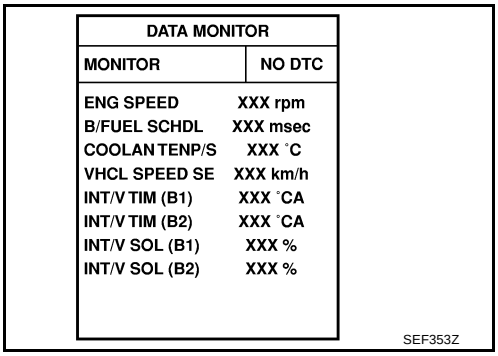
- **If DTC P1110 (B1), P1135 (B2) are displayed with DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2), first perform trouble diagnosis for "DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2)". See** EC-429 or EC-452
- **If "DTC Confirmation Procedure" has been previously conducted, always turn 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. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	1st position
Driving condition	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)



4. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	Idle
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	"P" or "N" position

5. If 1st trip DTC is detected, go to EC-426, "Diagnostic Procedure" .

With GST

Follow the procedure "With CONSULT-II" above.

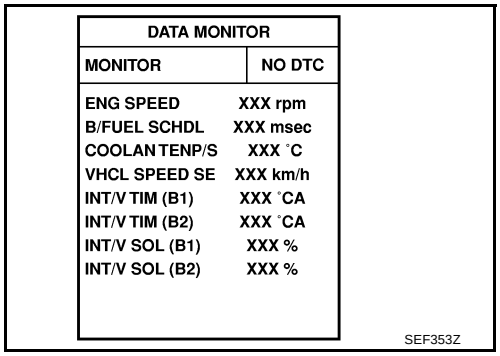
PROCEDURE FOR MALFUNCTION B

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	2,000 - 3,000 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 90°C (158 - 194°F)
Selector lever	1st or position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)



4. If 1st trip DTC is detected, go to EC-426, "Diagnostic Procedure"
.

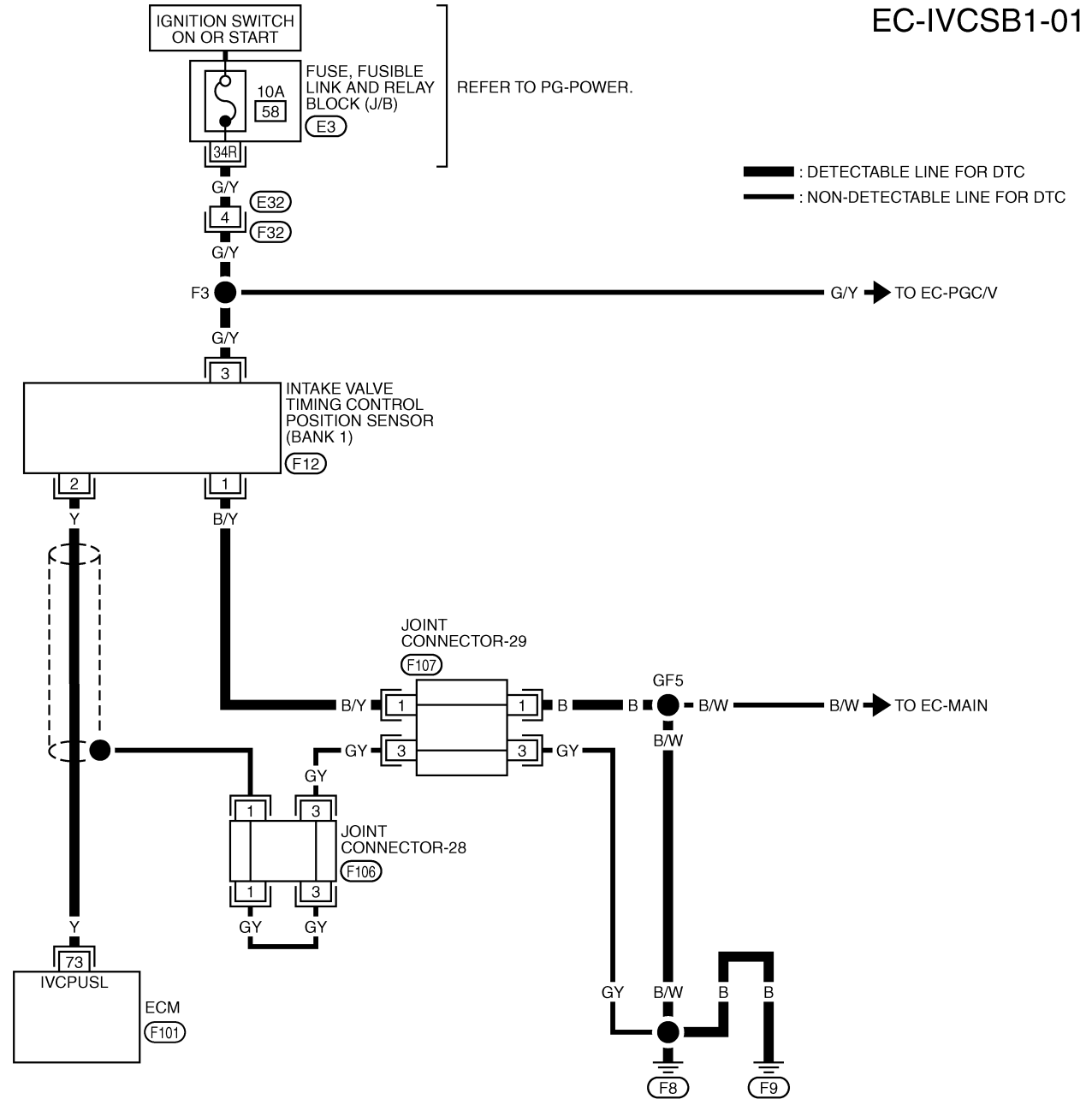
With GST

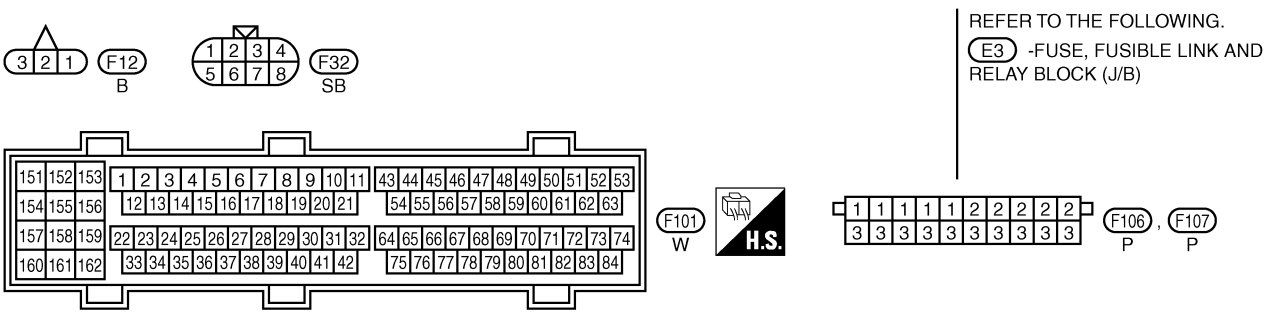
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS003D4

BANK 1



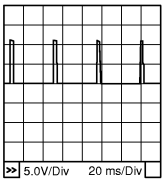
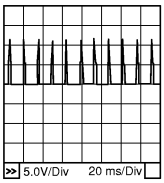


TBWM0113E

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

CAUTION:

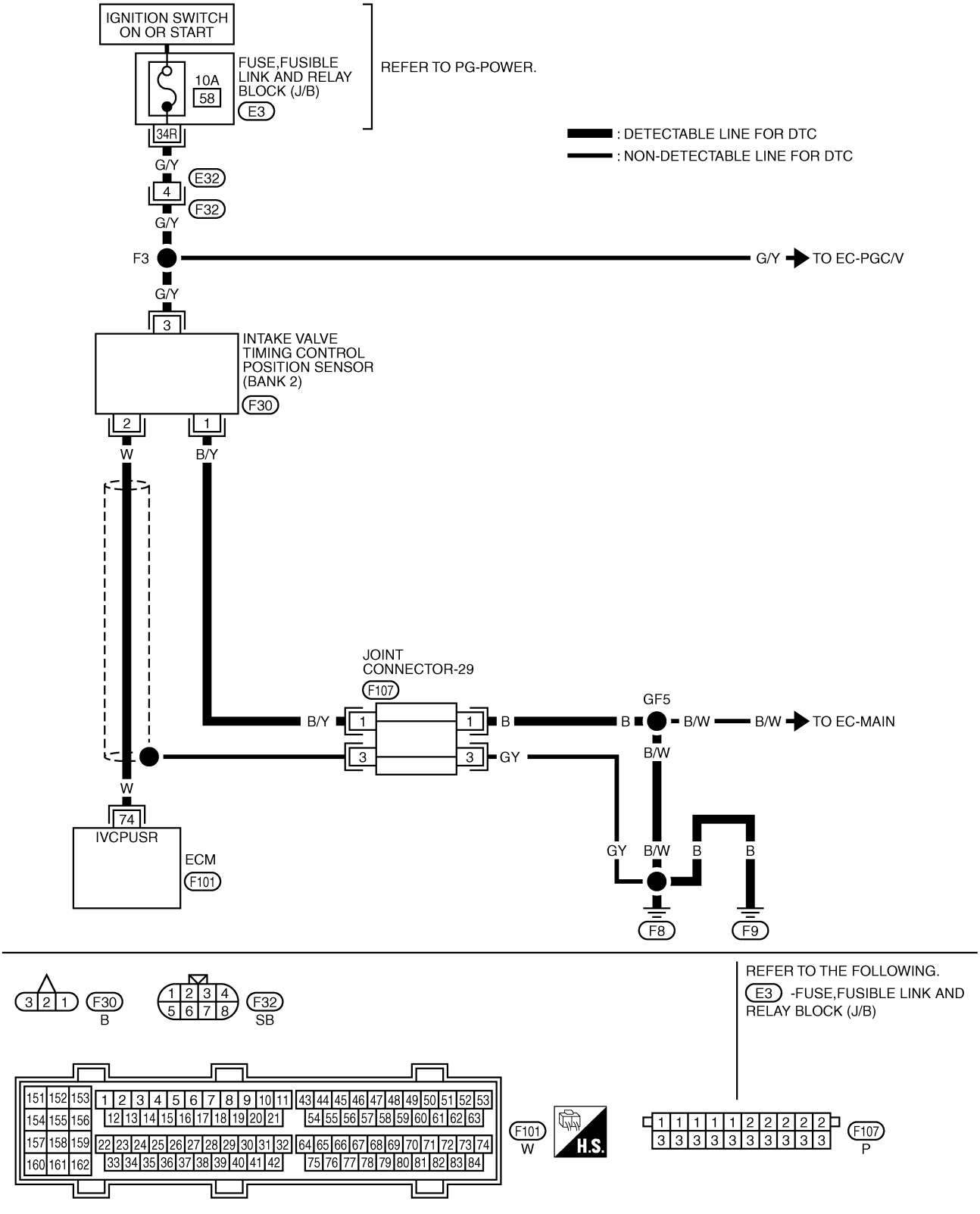
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	Y	Intake valve timing control position sensor (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E

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

BANK 2

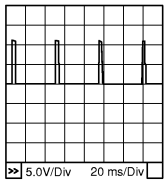
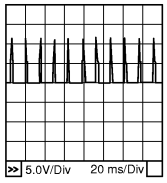
EC-IVCSB2-01



TBWM0114E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Intake valve timing control position sensor (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E

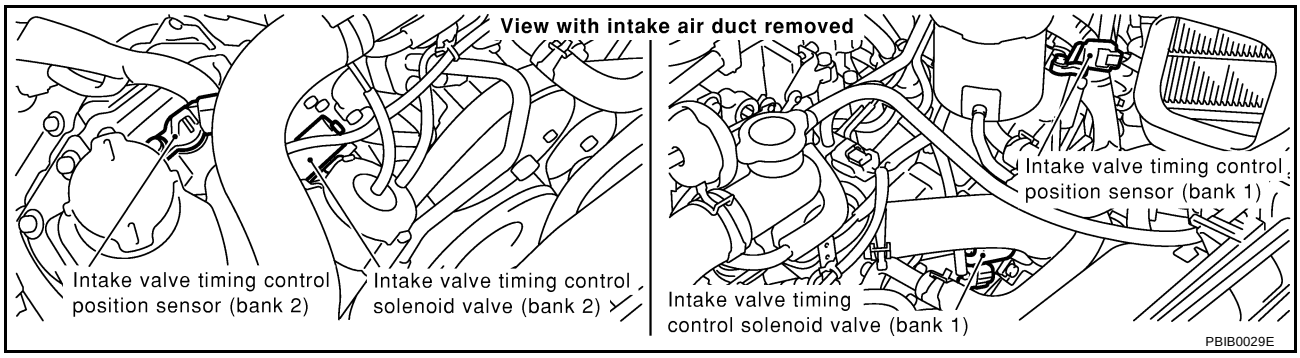
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS003D5

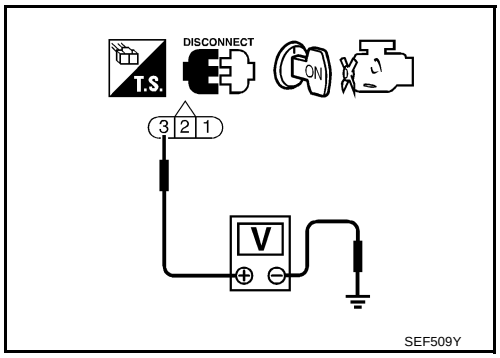
1. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between intake valve timing control position sensor terminal 3 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 E32, F32
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between intake valve timing control position sensor and fuse

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between intake valve timing control position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-29
- Harness for open or short between intake valve timing control position sensor and engine ground

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

5. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 73 (bank 1) or 74 (bank 2) and intake valve timing control position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-459, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake valve timing control position sensor.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-344, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

9. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-45, "TIMING CHAIN" .

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal pick-up cutout of camshaft.

10. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect joint connector-28 harness connector.
2. Check the following. For the location of joint connector, refer to PG-26, "Harness Layout" .

- Harness continuity between joint connector-28 terminals 1 and 3
- Harness continuity between joint connector-28 terminal 3 and joint connector-29 terminal 3
- Harness continuity between joint connector-29 terminal 3 and ground
- Joint connectors-28, 29

Continuity should exist.

3. Also check harness for short to power.
4. Then reconnect joint connectors-28, 29.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

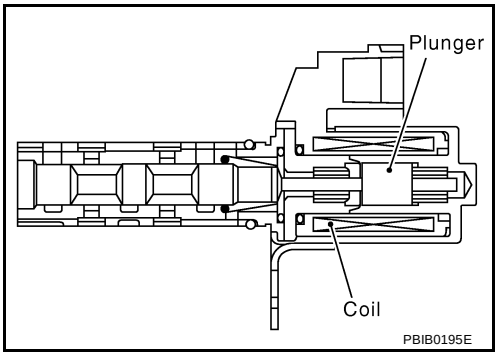
DTC P1111 (BANK 1), P1136 (BANK 2) IVT CONTROL SOLENOID VALVE (CIRCUIT)

PFP:23796

Component Description

EBS003CL

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

EBS003CM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 50%

On Board Diagnosis Logic

EBS003CN

Malfunction is detected when an improper voltage is sent to the ECM through intake valve timing control solenoid valve.

Possible Cause

EBS003CO

- Harness or connectors
  (Intake valve timing control solenoid valve circuit is open or shorted.)
- Intake valve timing control solenoid valve.

DTC Confirmation Procedure

EBS003CP

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. Maintain the following conditions for at least 5 seconds.

ENG SPEED	More than idle speed
Selector lever	“P” or “N” position

4. If 1st trip DTC is detected, go to EC-433, "Diagnostic Procedure" .

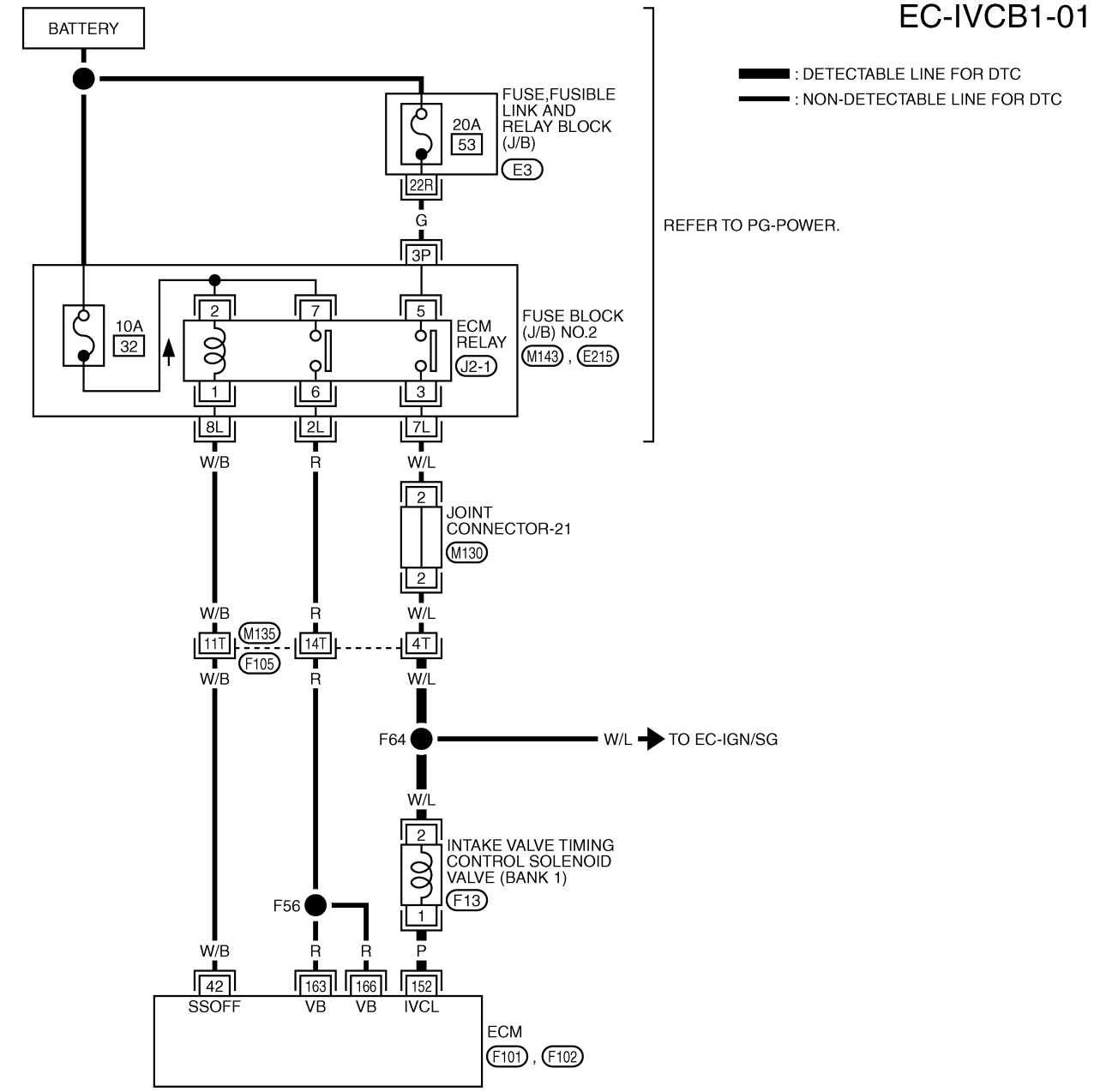
WITH GST

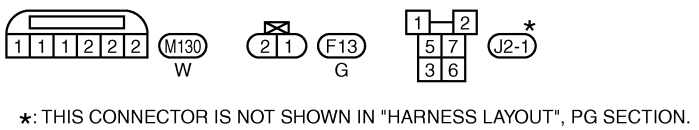
Following the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS003CQ

BANK 1





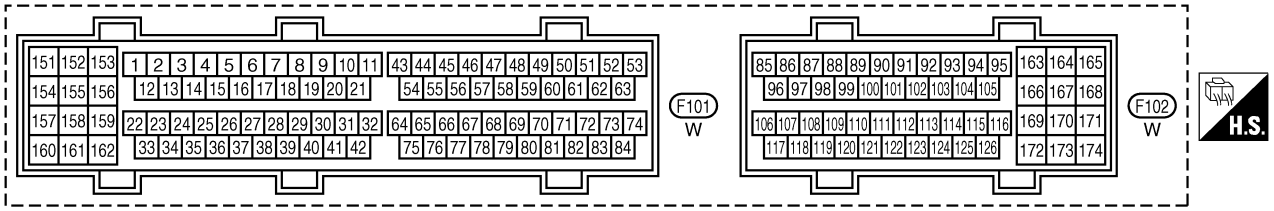
*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M143 , E215 -FUSE BLOCK-JUNCTION BOX (J/B) NO.2

E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

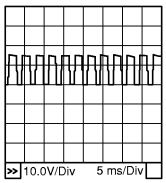
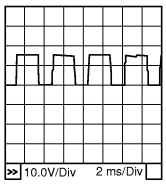


TBWM0111E

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

CAUTION:

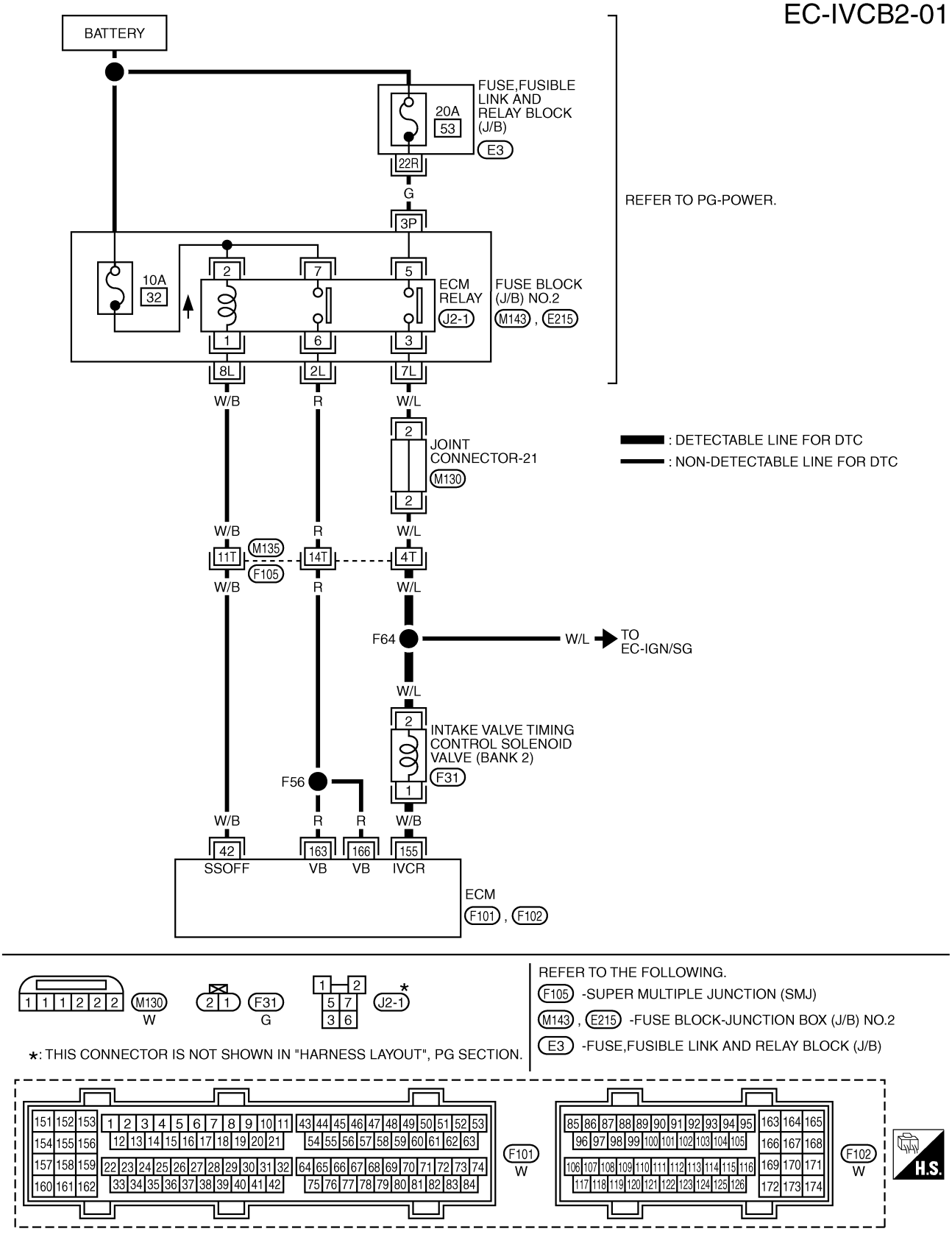
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
152	P	Intake valve timing control solenoid valve (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0059E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	7 - 12V★  PBIB0060E

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

BANK 2

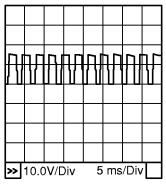
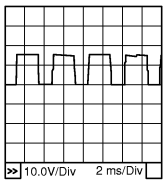
EC-IVCB2-01



TBWM0112E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
155	W/B	Intake valve timing control solenoid valve (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0059E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	7 - 12V★  PBIB0060E

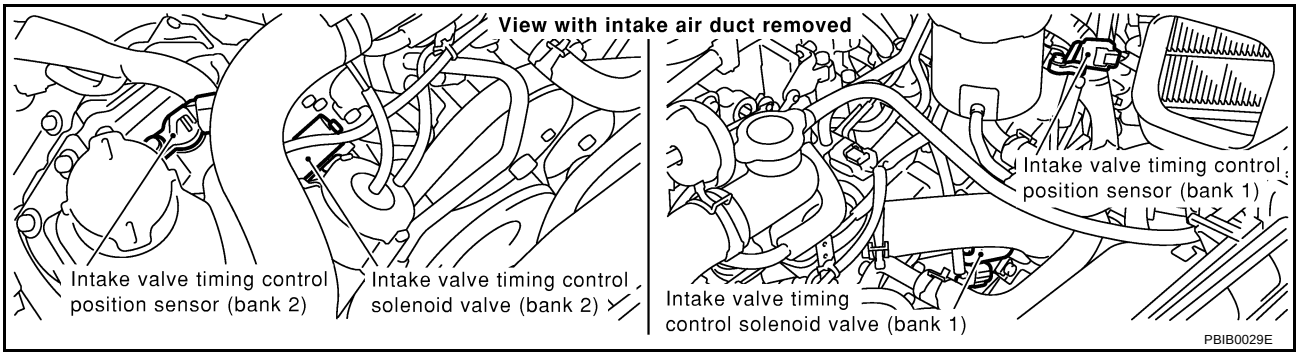
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS003CR

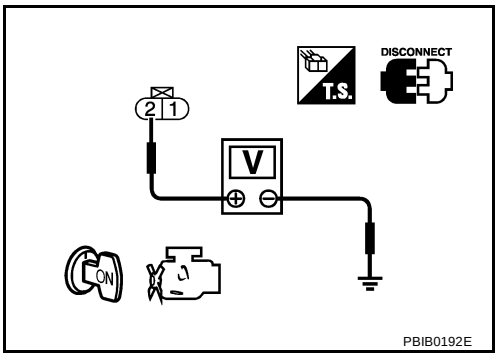
1. CHECK POWER SUPPLY CIRCUIT

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 2 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 M135, F105
- Harness for open or short between intake valve timing control solenoid valve and harness connector F105

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 152 (bank 1) or 155 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 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-434, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

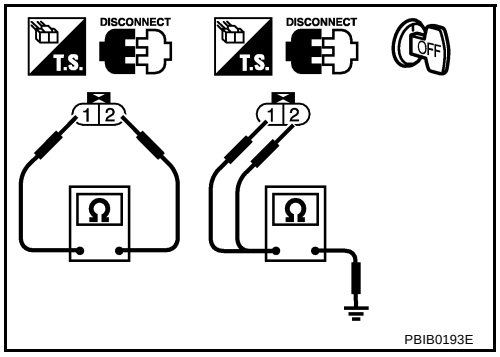
Component Inspection

EBS003CS

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 as follows.

Terminals	Resistance
1 and 2	7.0 - 7.5Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

EBS003CT

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-45, "TIMING CHAIN" .

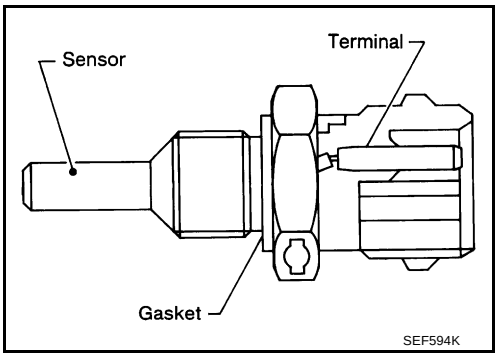
DTC P1119 RADIATOR COOLANT TEMPERATURE SENSOR (CIRCUIT)

PFP:22630

Component Description

EBS002KR

The radiator coolant temperature sensor is installed on the radiator lower tank and used to detect the radiator coolant temperature. The sensor modifies a voltage signal from the ECM and returns the modified signal to the ECM as the radiator coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of thermistor decreases as temperature increase. The ECM uses this signal to control the cooling fan speed control solenoid valve.



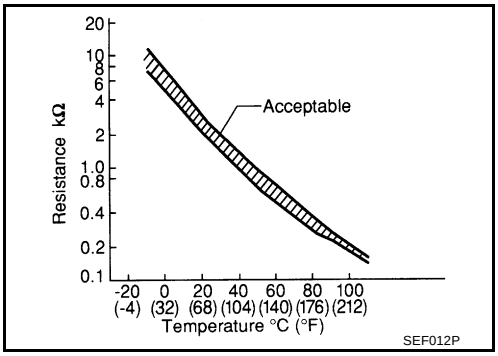
<Reference data>

Radiator coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	9.017 - 9.723
20 (68)	3.5	2.437 - 2.595
90 (194)	0.9	0.2416 - 0.2575
110 (230)	0.64	0.1451 - 0.1522
150 (302)	0.32	0.05927 - 0.06267

*: These data are reference values and are measured between ECM terminal 122 (Radiator coolant temperature sensor) and body 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

EBS002KS

Malfunction is detected when an excessively high or low voltage from the radiator coolant temperature sensor is sent to ECM.

FAIL-SAFE MODE

ECM controls on assumption that the radiator coolant temperature is 97 °C (207 °F).

Possible Cause

EBS002KT

- Harness or connectors
  (The radiator coolant temperature sensor circuit is open or shorted.)
- Radiator coolant temperature sensor

DTC Confirmation Procedure

EBS002KU

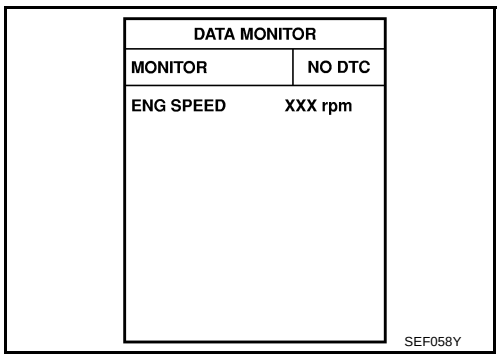
NOTE:

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 1st trip DTC is detected, go to EC-438, "Diagnostic Procedure"
.



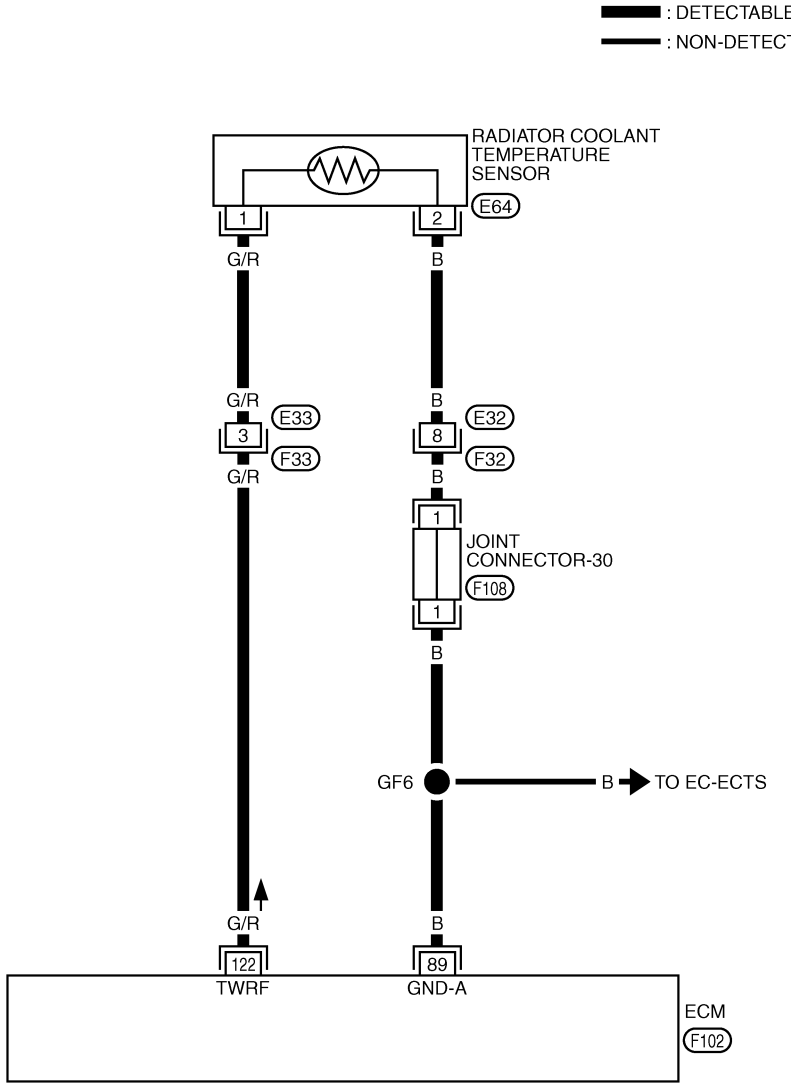
WITH GST

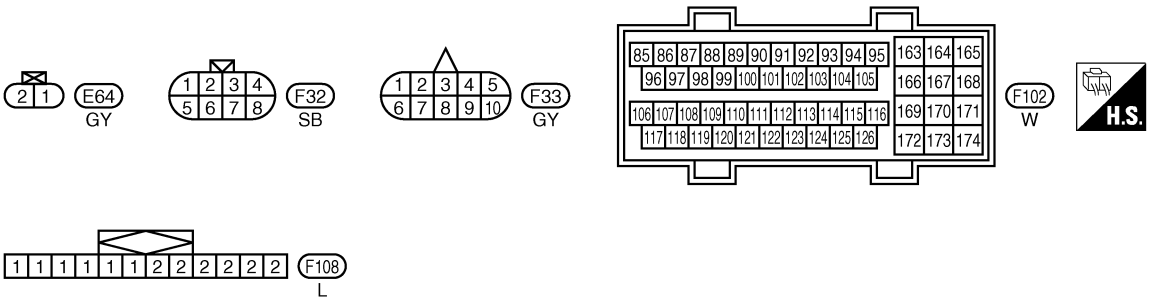
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002KV

EC-RCTS-01





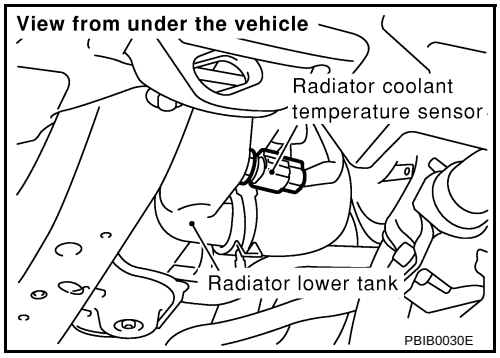
TBWM0049E

Diagnostic Procedure

EBS002KW

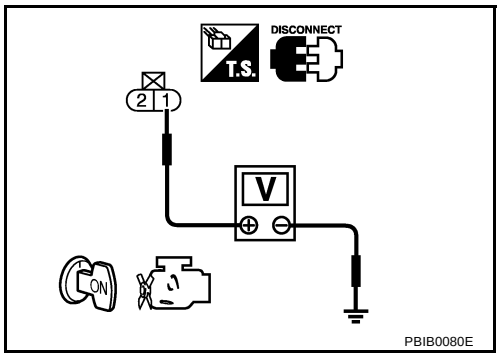
1. CHECK RADIATOR COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect radiator coolant temperature sensor harness connector.
3. Turn ignition switch “ON”.



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

Voltage: Approximately 5V



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E33, F33
- Harness for open or short between ECM and radiator coolant temperature sensor

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

3. CHECK RADIATOR COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between radiator coolant temperature 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E32, F32
- Joint connector-30
- Harness for open or short between ECM and radiator coolant temperature sensor

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

5. CHECK RADIATOR COOLANT TEMPERATURE SENSOR

Refer to EC-439, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace radiator coolant temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

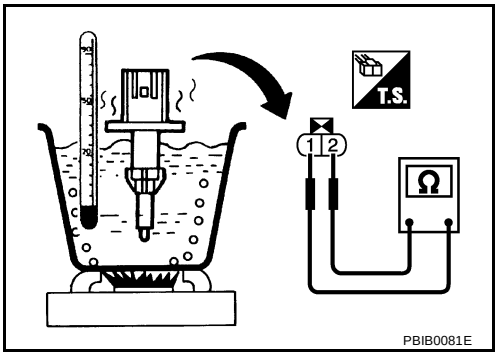
>> **INSPECTION END**

Component Inspection

EBS002KX

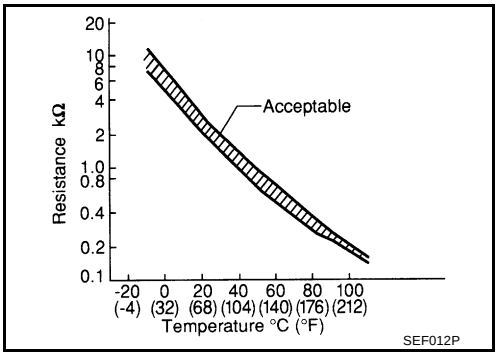
RADIATOR COOLANT TEMPERATURE SENSOR

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



<Reference data>

Radiator coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.437 - 2.595
90 (194)	0.9	0.2416 - 0.2575



*: These data are reference values and are measured between ECM terminal 122 (Radiator coolant temperature sensor) and body 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.

2. If NG, replace radiator coolant temperature sensor.

Removal and Installation

EBS002KY

RADIATOR COOLANT TEMPERATURE SENSOR

Refer to CO-11, "RADIATOR" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Description

EBS002WP

Electric Throttle Control Actuator consists of throttle control motor, acceleration pedal position sensor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
Accelerator pedal position sensor detects the accelerator pedal position, the opening and closing speed of the accelerator pedal and feeds 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.
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

EBS00HW0

For type II and Type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .), this self-diagnosis has the one trip detection logic and the MIL will not illuminate for this malfunction.
Malfunction is detected when
(Malfunction A) electric throttle control actuator does not function properly due to the return spring malfunction,
(Malfunction B) throttle valve opening angle in fail-safe mode is not in specified range,
(Malfunction C) ECM detect the throttle valve is stuck open.

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction A, B or C is detected

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. When throttle is not movable, negative pressure does not occur because throttle valve is kept open, therefore if depressing brake pedal two or three times, braking performance lowers.

Possible Cause

EBS002WR

- Electric throttle control actuator

DTC Confirmation Procedure

EBS002WS

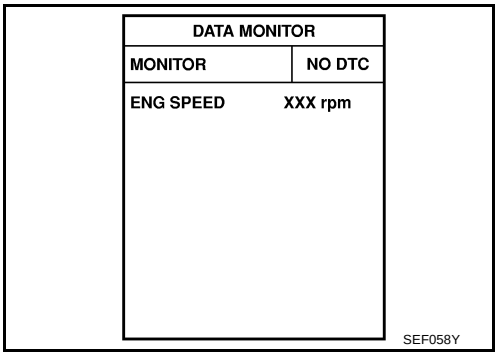
NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A AND B” first. If the (1st trip) DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION C”.**
  If there is no problem on “PROCEDURE FOR MALFUNCTION A AND B”, 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 witch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position 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-442, "Diagnostic Procedure" .



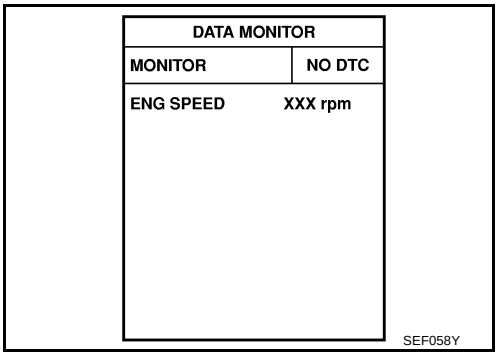
With GST

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 and wait at least 2 seconds.
4. Shift selector lever to “N” or “P” position.
5. Start engine and let it idle for 3 seconds.
6. If (1st trip) DTC is detected, go to EC-442, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

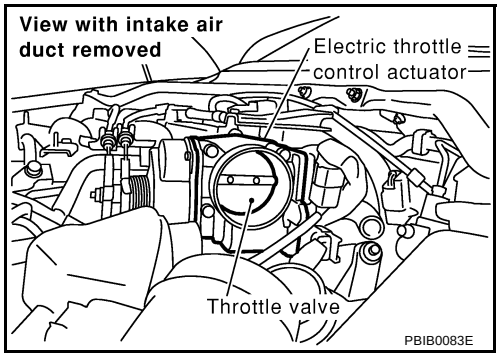
EBS002WT

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-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION (CIRCUIT)

PFP:16119

Description

EBS002OO

NOTE:
If DTC P1122 is displayed with DTC P1121, first perform the trouble diagnosis for DTC P1121. Refer to EC-440, "DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR" .

Electric Throttle Control Actuator consists of throttle control motor, acceleration pedal position sensor, 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 the 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

EBS002OQ

For type II or type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .), this self-diagnosis has the one trip detection logic and the MIL will not illuminate for this malfunction.
Malfunction is detected when
(Malfunction A) electric throttle control feedback function does not operate properly,
(Malfunction B) an excessively high ampere of current flows through throttle control motor to ECM.

FAIL-SAFE MODE

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

Detected items	Engine operating 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. When the accelerator pedal depressed value reaches a throttle opening of 30 degrees or more, the throttle valve opens to a maximum of 20 degrees by the accelerator wire.

Possible Cause

EBS002OR

- Harness or connectors
  (Throttle control motor circuit is open or shorted.)
- Electric throttle control actuator

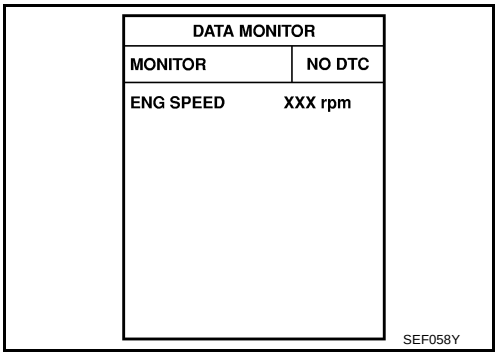
DTC Confirmation Procedure

EBS002OS

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 (1st trip) DTC is detected, go to EC-445, "Diagnostic Procedure" .



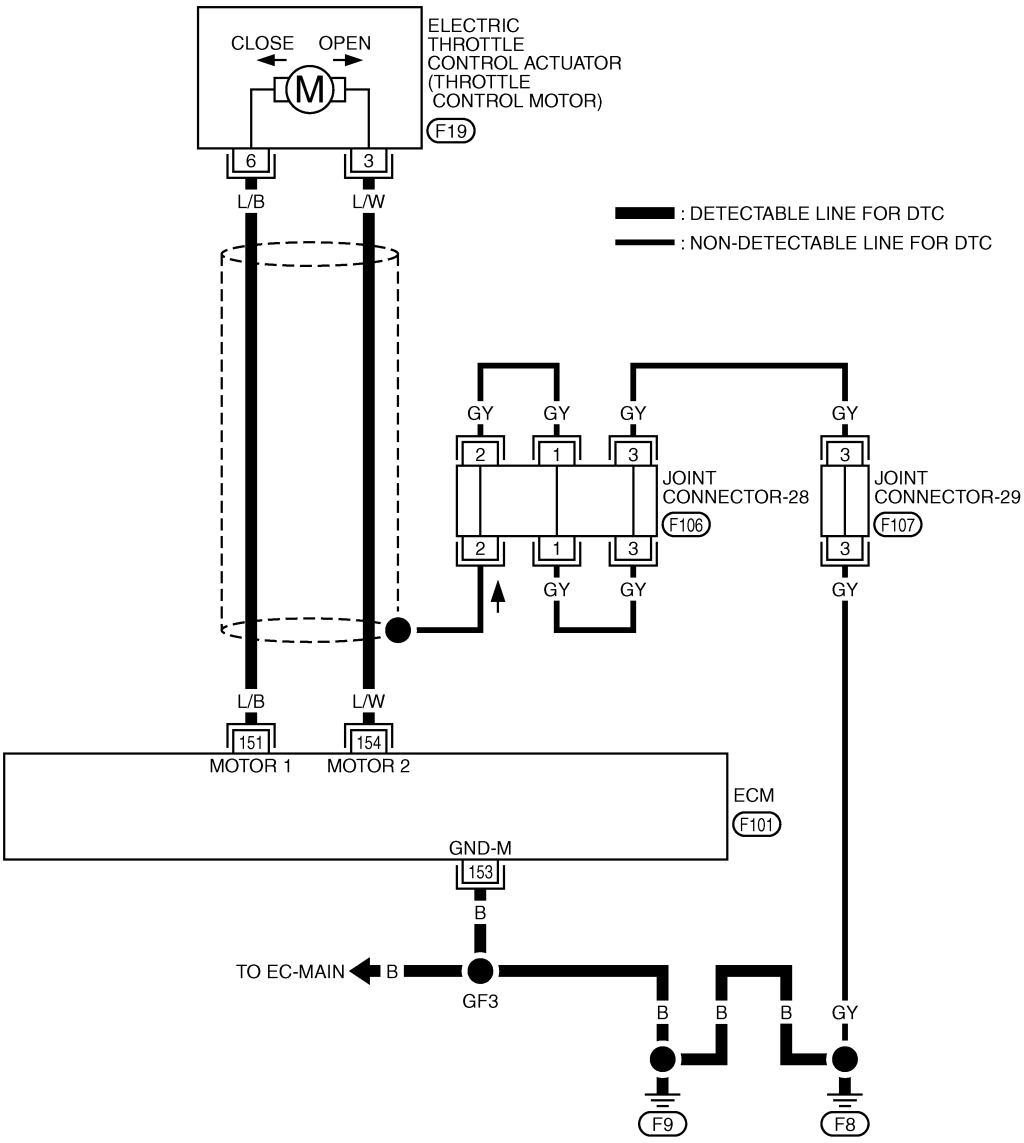
WITH GST

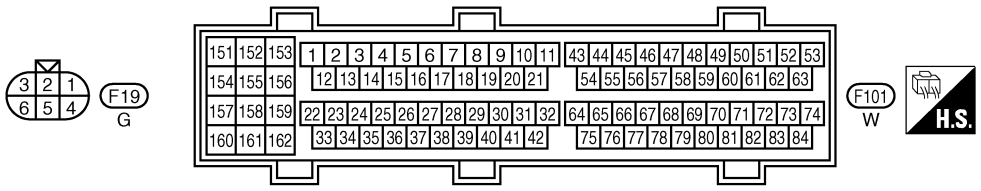
Follow the procedure “WITH CONSULT-II” above.

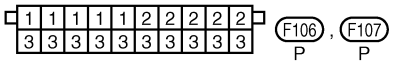
Wiring Diagram

EBS002OT

EC-T/MTR-01



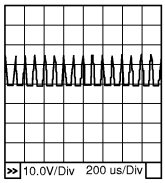
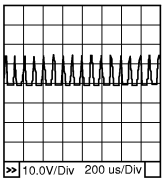




TBWM0117E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
151	L/B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Accelerator pedal is depressing	0 - 14V★  PBIB0058E
154	L/W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Accelerator pedal is releasing	0 - 14V★  PBIB0061E

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

Diagnostic Procedure

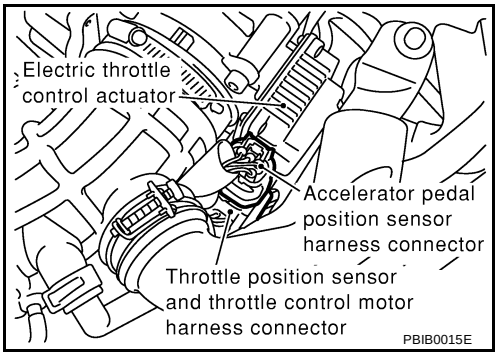
EBS002OU

1. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect electric throttle control actuator harness connector F19.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 151 and electric throttle control actuator terminal 6, ECM terminal 154 and electric throttle control actuator 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 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 153 and ground.

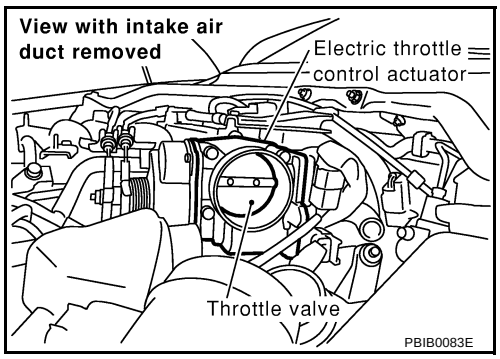
   Continuity should exist.

2. Also check harness for short to power.

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

3. 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 4.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

4. CHECK THROTTLE CONTROL MOTOR

Refer to EC-446, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
OK >> Repair or replace harness or connectors.

6. REPLACE ELECTRIC THROLLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-45, "Throttle Valve Closed Position Learning" .
3. Perform EC-45, "Idle Air Volume Learning" .

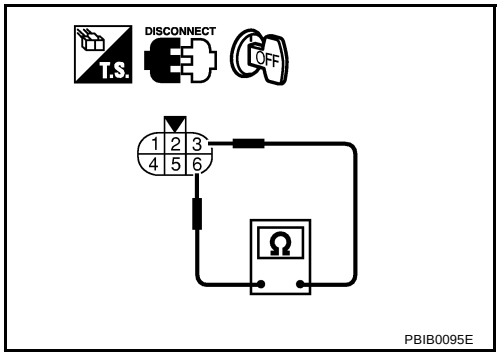
>> **INSPECTION END**

Component Inspection

EBS002OV

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector F19.
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-45, "Throttle Valve Closed Position Learning" .
5. Perform EC-45, "Idle Air Volume Learning" .

DTC P1123 THROTTLE CONTROL MOTOR RELAY (CIRCUIT)

PFP:16119

Component Description

EBS002Q4

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

EBS002Q5

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

EBS002Q6

For type II or type III vehicles (Refer to EC-9, "How to Check Vehicle Type" .), this self-diagnosis has the one trip detection logic and the MIL will not illuminate for this malfunction.
Malfunction is detected when
(Malfunction A) ECM detect the throttle control motor relay is stuck ON,
(Malfunction B) ECM detect the throttle control motor relay is stuck OFF.

FAIL-SAFE MODE

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

Detected items	Engine operating 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. When the accelerator pedal depressed value reaches a throttle opening of 30 degrees or more, the throttle valve opens to a maximum of 20 degrees by the accelerator wire.

Possible Cause

EBS002Q7

- Harness or connectors
  (Throttle control motor relay circuit is open or shorted.)
- Throttle control motor relay

DTC Confirmation Procedure

EBS002Q8

NOTE:

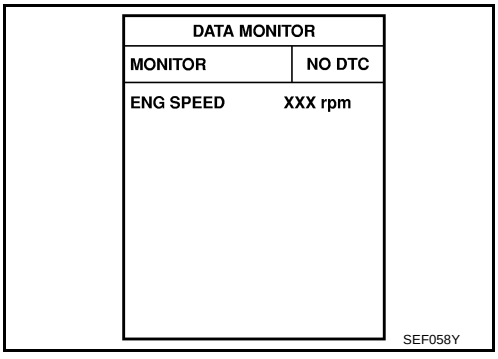
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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 wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-449, "Diagnostic Procedure" .



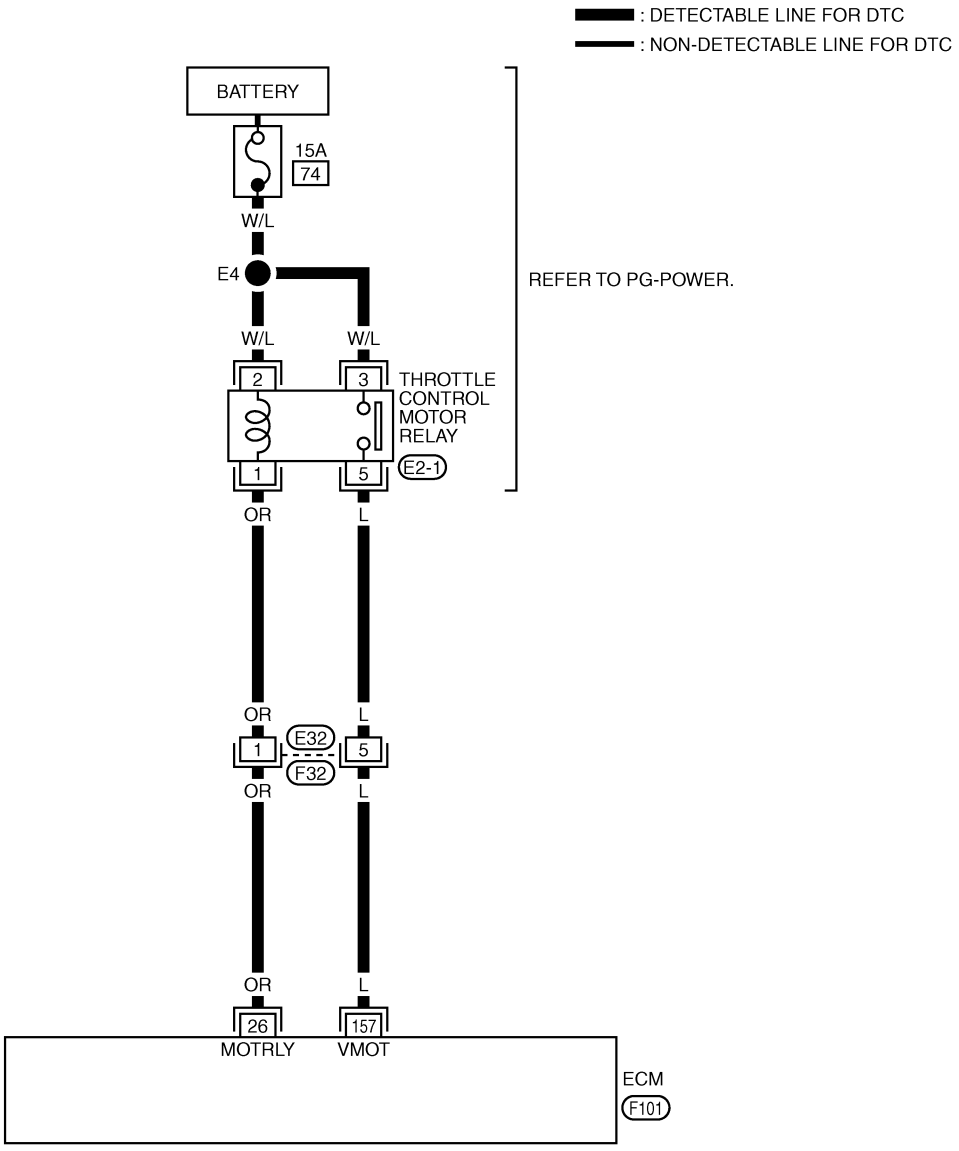
WITH GST

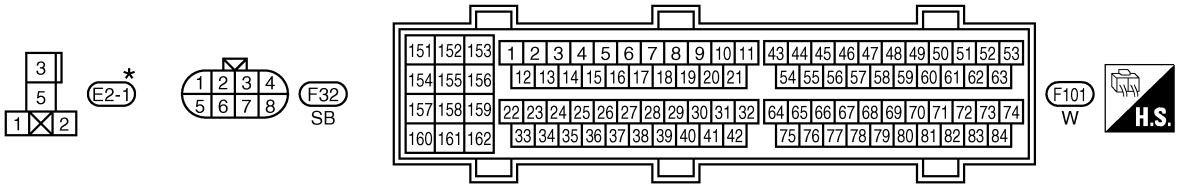
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS002Q9

EC-TM/RLY-01





*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWM0053E

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

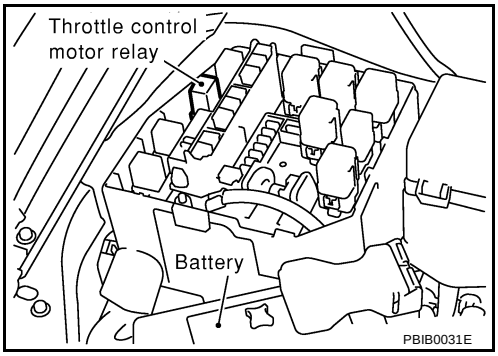
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
157	L	Throttle control motor relay power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS002QA

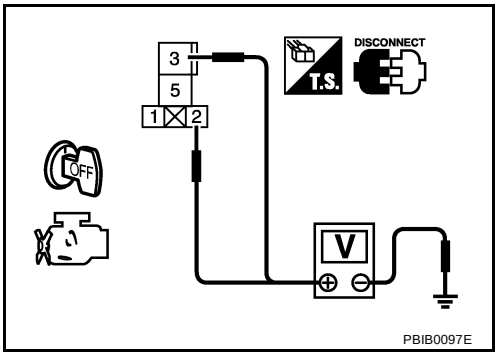
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay harness connector.



3. Check voltage between throttle control motor relay terminals 2, 3 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.

- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check continuity between ECM terminal 157 and throttle control motor relay terminal 5. 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 >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E32
- Harness for open or short between ECM and throttle control motor relay

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

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 26 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E32
- Harness for open or short between ECM and throttle control motor relay

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

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-451, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace throttle control motor relay.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

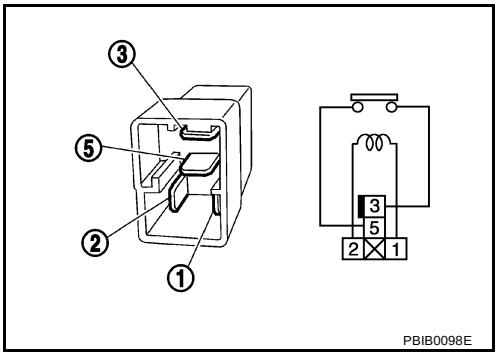
EBS002QB

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



PBIB0098E

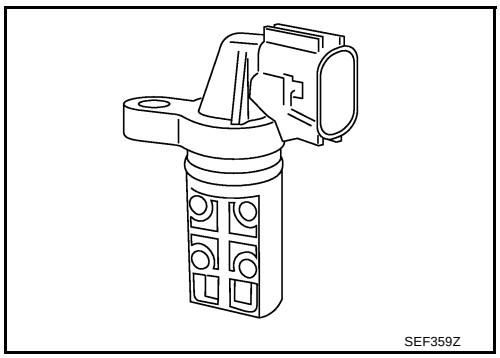
DTC P1140 (BANK 1), P1145 (BANK 2) IVT CONTROL POSITION SENSOR (CIRCUIT)

PFP:23731

Component Description

EBS003CV

Intake valve timing control position sensors are located in the front cylinder heads in both bank 1 and bank 2.
This sensor uses a Hall IC (element).
The cam position is determined by the intake primary cam sprocket concave (in three places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.



CONSULT-II Reference Value in Data Monitor Mode

EBS003CW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 20°CA

On Board Diagnosis Logic

EBS003CX

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

Possible Cause

EBS003CY

- Harness or connectors
  (Intake valve timing control position sensor circuit is open or shorted)
- Intake valve timing control position sensor
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)
- Accumulation of debris to the signal pick-up portion of the camshaft

DTC Confirmation Procedure

EBS003CZ

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. Maintain the following conditions for at least 10 seconds.

ENG SPEED	More than idle speed
Selector lever	“P” or “N” position

4. If 1st trip DTC is detected, go to EC-456, "Diagnostic Procedure" .

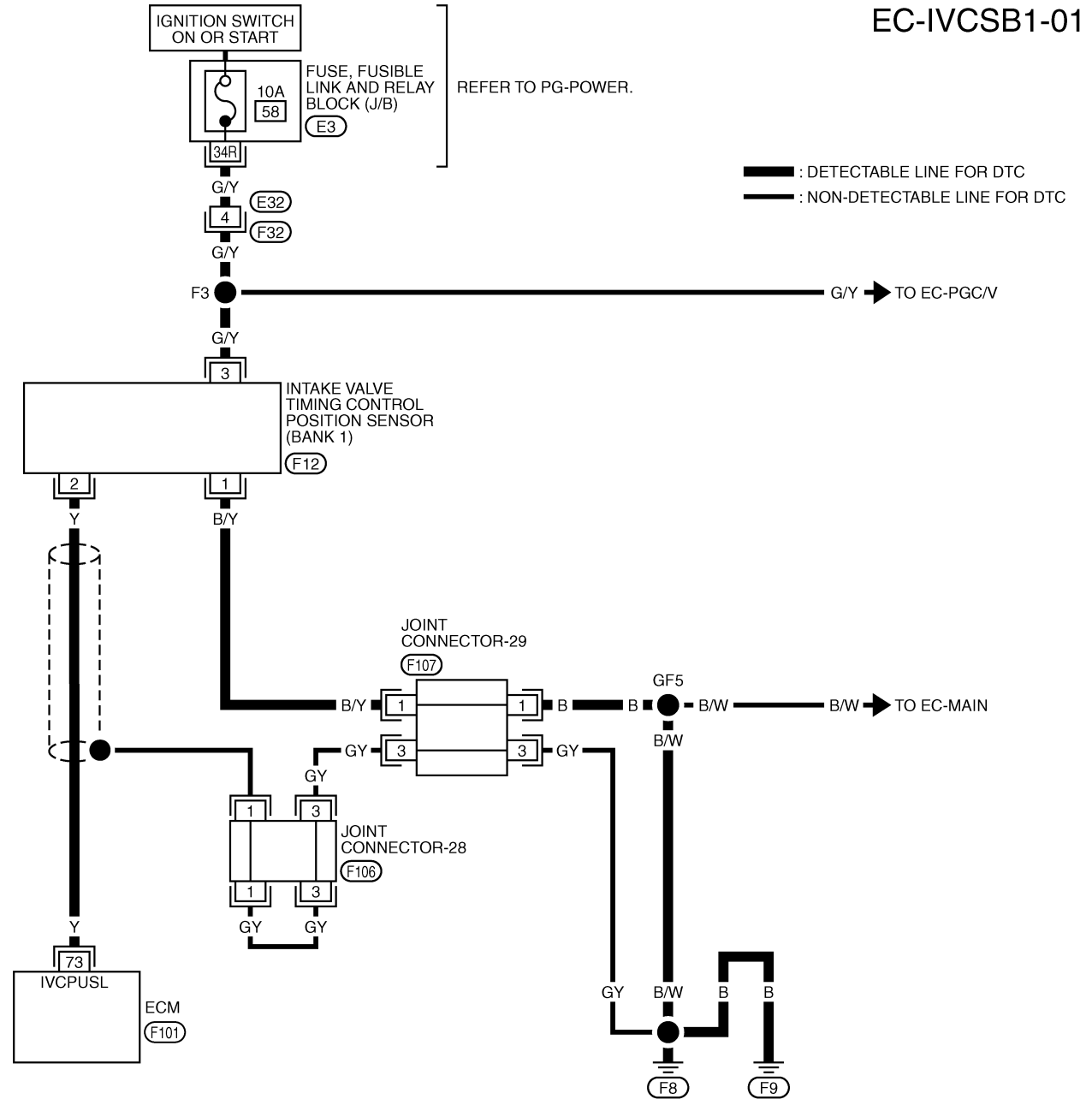
WITH GST

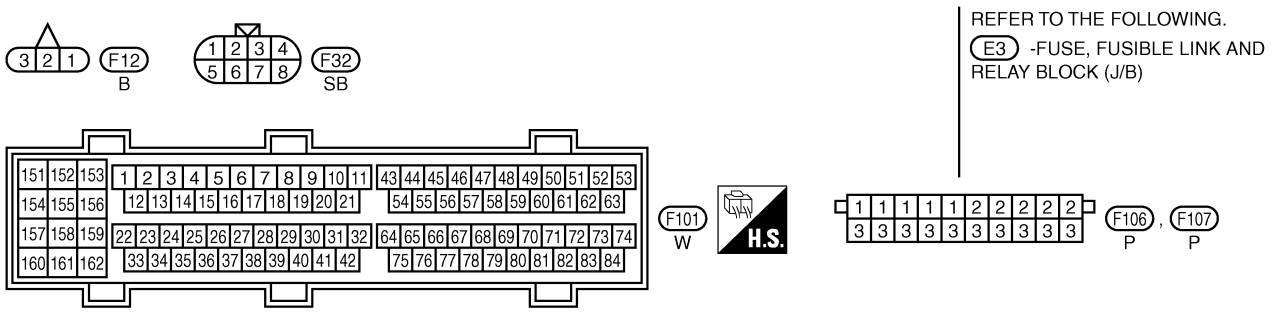
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS003D0

BANK 1



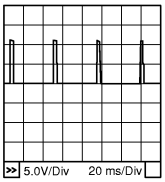
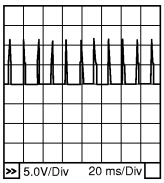


TBWM0113E

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

CAUTION:

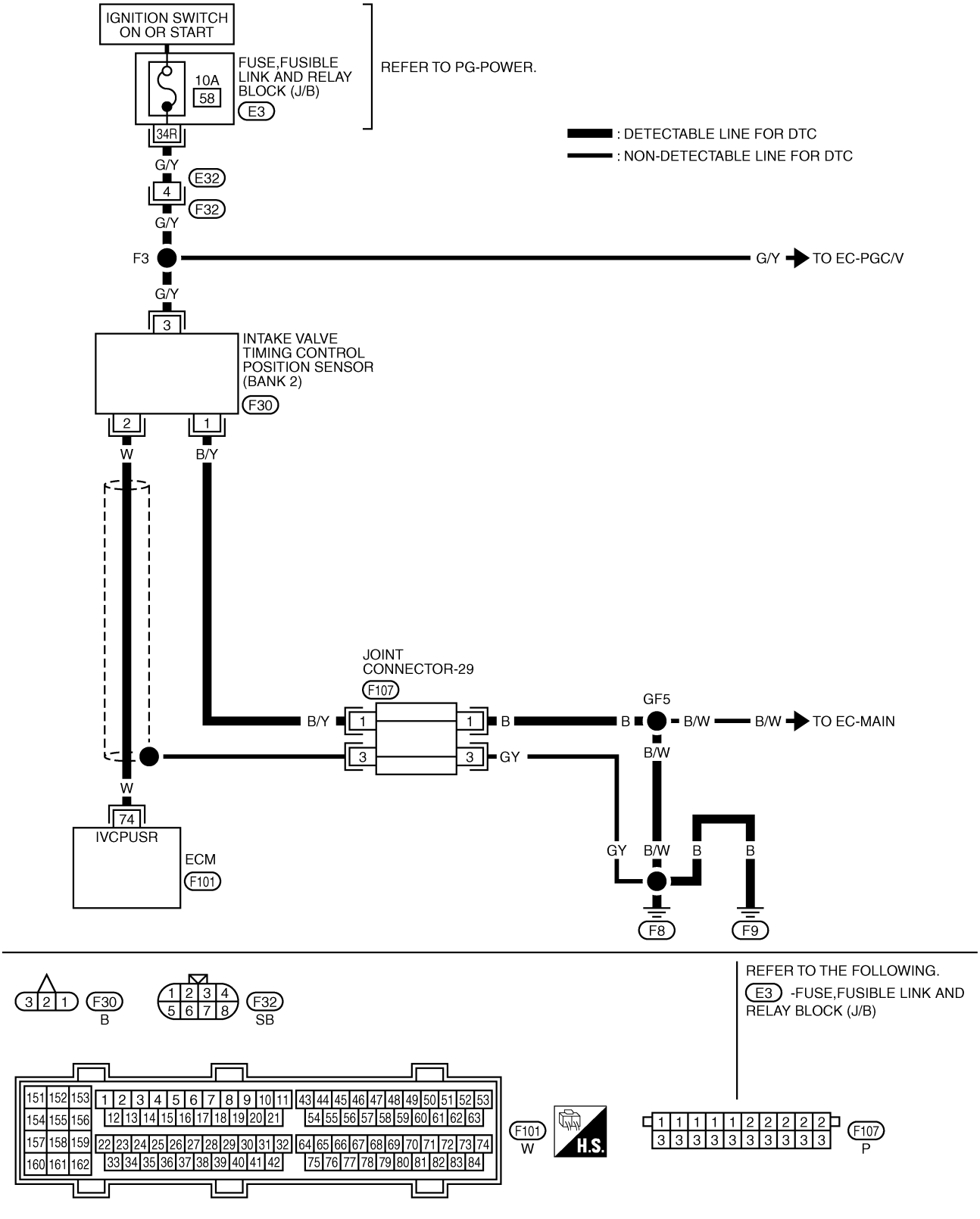
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	Y	Intake valve timing control position sensor (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E

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

BANK 2

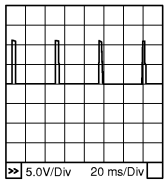
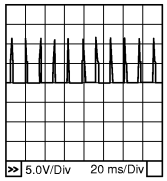
EC-IVCSB2-01



TBWM0114E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Intake valve timing control position sensor (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1.0V★  PBIB0054E
			[Engine is running] ● Engine speed is 2,000 rpm.	0 - 1.0V★  PBIB0055E

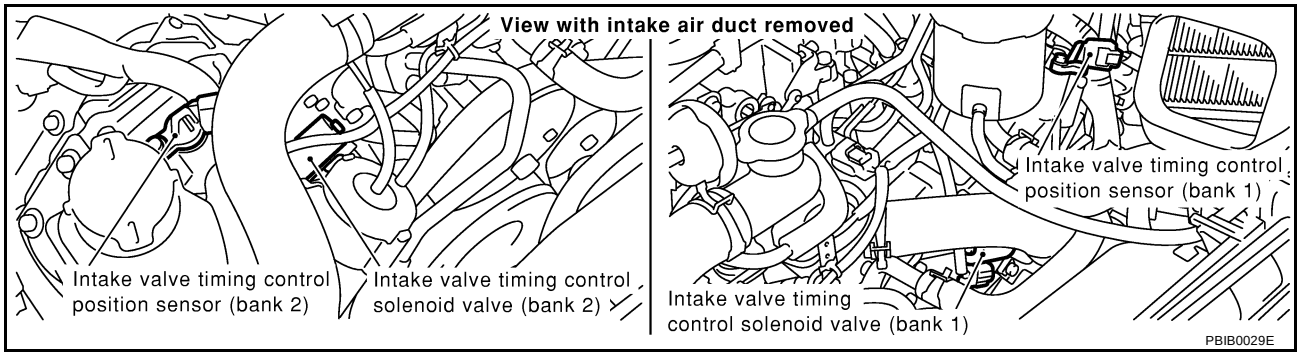
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS003D3

1. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

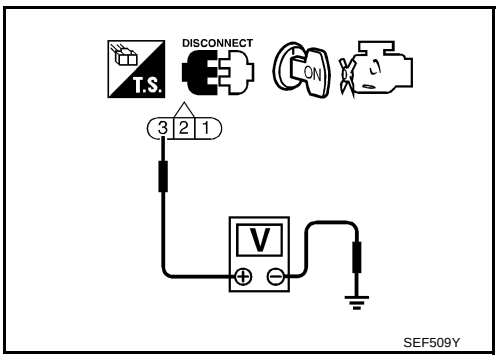
1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control position sensor harness connector.



PBIB0029E

3. Turn ignition switch “ON”.
4. Check voltage between intake valve timing control position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



SEF509Y

OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E32, F32
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between intake valve timing control position sensor and fuse

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between intake valve timing control position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-29
- Harness for open or short between intake valve timing control position sensor and engine ground

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

5. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 73 (bank 1) or 74 (bank 2) and intake valve timing control position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-459, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake valve timing control position sensor.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-344, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

9. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-45, "TIMING CHAIN" .

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal pick-up cutout of camshaft.

10. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect joint connector-28 harness connector.
2. Check the following. For the location of joint connector, refer toPG-26, "Harness Layout" .

- Harness continuity between joint connector-28 terminals 1 and 3
- Harness continuity between joint connector-28 terminal 3 and joint connector-29 terminal 3
- Harness continuity between joint connector-29 terminal 3 and ground
- Joint connectors-28, 29

Continuity should exist.

3. Also check harness for short to power.
4. Then reconnect joint connectors-28, 29.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

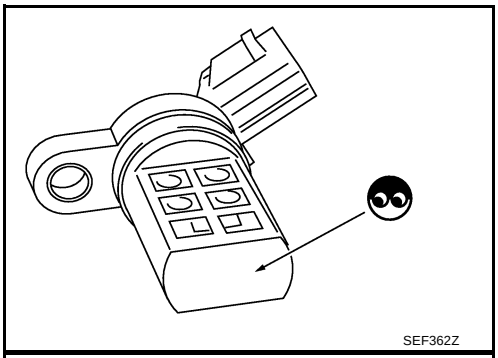
>> **INSPECTION END**

Component Inspection

EBS003D2

INTAKE VALVE TIMING CONTROL POSITION SENSOR

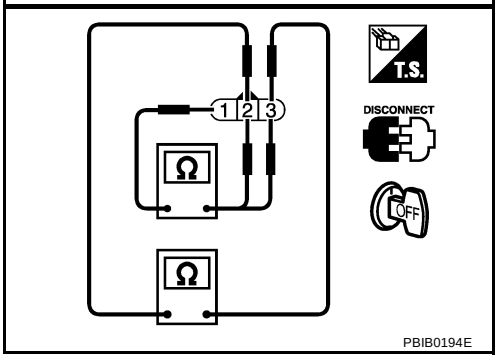
1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



SEF362Z

5. Check resistance as shown below.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
2 (+) - 1 (-)	
3 (+) - 2 (-)	



PBIB0194E

6. If NG, replace intake valve timing control position sensor.

Removal and Installation

EBS003D7

INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to EM-45, "TIMING CHAIN" .

DTC P1148 (BANK 1), P1168 (BANK 2) CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

EBS0019B

★The closed loop control has the one trip detection logic.
Malfunction is detected when the closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition, the closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.

Possible Cause

EBS0019C

- The heated oxygen sensor 1 circuit is open or shorted.
- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater

DTC Confirmation Procedure

EBS0019D

CAUTION:
Always drive vehicle at a safe speed.

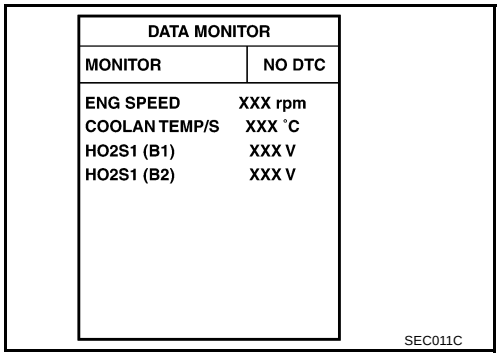
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **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. Select “DATA MONITOR” mode with CONSULT-II.
3. Hold engine speed at 2,000 rpm and check one of the following.
   - “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
   - “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.
     If the check result is NG, perform EC-461, "Diagnostic Procedure" .
     If the check result is OK, perform the following step.
4. Let engine idle at least 5 minutes.
5. Maintain the following condition at least 50 consecutive seconds.



B/FUEL SCHDL	4 msec or more
ENG SPEED	More than 1,300 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-461, "Diagnostic Procedure" .

Overall Function Check

EBS0019E

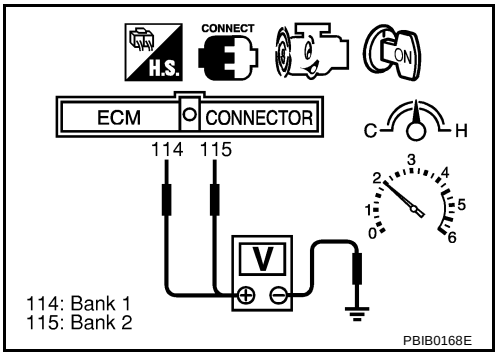
Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 114 [HO2S1 (B1) signal] or 115 [HO2S1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no-load.

- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4. If NG, go to EC-461, "Diagnostic Procedure" .



Diagnostic Procedure

EBS0019F

Perform trouble diagnosis for “DTC P0133, P0153”,EC-226 .

DTC P1211 VDC/TCS/ABS CONTROL UNIT

PFP:47850

Description

EBS002L8

The malfunction information related to VDC/TCS/ABS control unit is transferred through the CAN communication line from VDC/TCS/ABS control unit to ECM.
Be sure to erase the malfunction information such as DTC not only for VDC/TCS/ABS control unit but also for ECM after the VDC/TCS/ABS related repair.

On Board Diagnosis Logic

EBS002L9

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.
Malfunction is detected when ECM receives a malfunction information from VDC/TCS/ABS control unit.

Possible Cause

EBS002LA

- VDC/TCS/ABS control unit
- TCS related parts (Refer to BRC-11, "TROUBLE DIAGNOSIS" .)

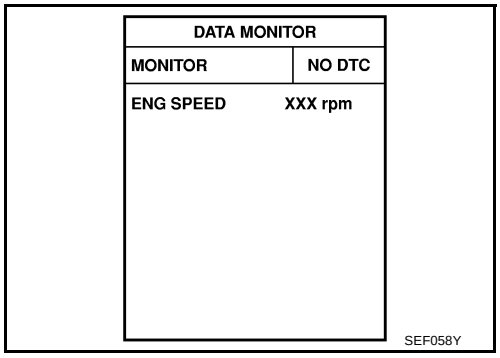
DTC Confirmation Procedure

EBS002LB

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V 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 60 seconds.
4. If 1st trip DTC is detected, go to EC-462, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS002LD

Go to BRC-11, "TROUBLE DIAGNOSIS" .

DTC P1212 VDC/TCS/ABS COMMUNICATION LINE

PFP:47850

Description

EBS002LE

NOTE:
If DTC P1212 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-151, "DTC U1000 CAN COMMUNICATION LINE" .
This CAN communication line is used to control the smooth engine operation of VDC/TCS/ABS during the TCS operation. Pulse signals are exchanged between ECM and ABS/TCS control unit.
Be sure to erase the malfunction information such as DTC not only in VDC/TCS/ABS control unit but also ECM after the VDC/TCS/ABS related repair.

On Board Diagnosis Logic

EBS002LF

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.
Malfunction is detected when ECM can not receive the information from VDC/TCS/ABS control unit continuously.

Possible Cause

EBS002LG

- Harness or connectors
  (The CAN communication line between ECM and VDC/TCS/ABS control unit is open or shorted.)
- VDC/TCS/ABS control unit
- Dead (Weak) battery

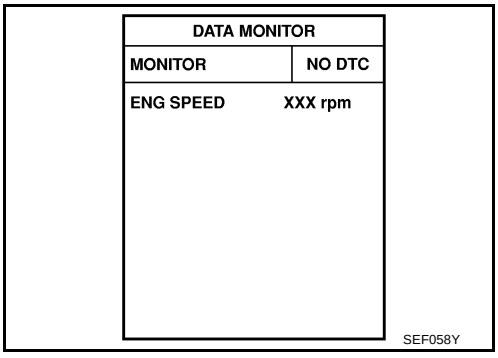
DTC Confirmation Procedure

EBS002LH

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V 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 10 seconds.
4. If a 1st trip DTC is detected, go to EC-463, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS002LJ

1. CHECK VDC/TCS/ABS CONTROL UNIT FUNCTION

Refer to BRC-11, "TROUBLE DIAGNOSIS" .

>> **INSPECTION END**

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

PFP:00021

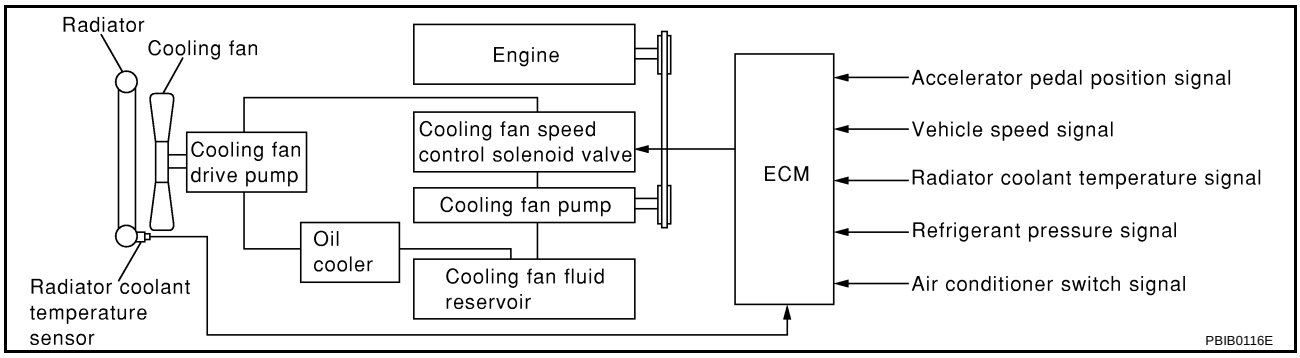
Description

EBS003CF

If DTC P1217 is displayed with DTC P1119 or P1480, first perform the trouble diagnosis for DTC P1119 or P1480. Refer to EC-435, "DTC P1119 RADIATOR COOLANT TEMPERATURE SENSOR (CIRCUIT)" or EC-534, "DTC P1480 COOLING FAN SPEED CONTROL SOLENOID VALVE (CIRCUIT)".

SYSTEM DESCRIPTION

This system controls the cooling fan operating speed. The opening of the cooling fan speed control solenoid valve changes to control oil pressure provided to the cooling fan drive pump.
This system consists of the cooling fan pump, cooling fan drive pump, cooling fan speed control solenoid valve, oil cooler, cooling fan fluid reservoir, etc.
The cooling fan pump is operated by engine with the drive belts and provides oil pressure to the cooling fan drive pump which operates the cooling fan. The cooling fan speed control solenoid valve is installed between the cooling fan pump and cooling fan drive pump. The solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the solenoid valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.



COOLING FAN SPEED CONTROL

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Cooling fan speed control	Cooling fan speed control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Radiator coolant temperature sensor	Radiator coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Wheel sensors (CAN communication)	Vehicle speed		
A/C auto amp. (CAN communication)	Air conditioner switch signal		

The ECM controls the cooling fan speed corresponding to the engine speed, the radiator coolant temperature, refrigerant pressure, vehicle speed, air conditioner switch signal, etc.
The ECM determines the target fan speed based on the basic fan speed considering the radiator coolant temperature and the engine speed. The ECM controls fan speed between 0 to 2,550 rpm.
When the cooling fan speed control solenoid valve is malfunctioning (does not operate), the cooling fan is operated at the maximum speed by engine through the drive belts.

Cooling Fan Basic Speed

unit: rpm

Air conditioner	Refrigerant pressure	Vehicle speed		
		Less than 20 km/h (12 MPH)	20 - 80 km/h (12 - 50 MPH)	More than 80 km/h (50 MPH)
OFF	-	300	300	300
ON	Less than 680 kPa (6.94 kg/cm^2 , 98.6 psi)	700	400	300
	680 - 1,660 kPa (6.94 - 16.93 kg/cm^2 , 98.6 - 240.7 psi)	900	700	300
	1,660 - 1,960 kPa (16.93 - 19.99 kg/cm^2 , 240.7 - 284.2 psi)	1,100	1,100	1,250
	More than 1,960 kPa (19.99 kg/cm^2 , 284.2 psi)	1,250	1,200	1,250

COMPONENT DESCRIPTION

Cooling Fan Speed Control Solenoid Valve

The cooling fan speed control solenoid valve uses a ON/OFF duty to control the pressure of the cooling fan fluid from the cooling fan pump. This solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse is sent to the solenoid valve, the lower speed the cooling fan operates.

CONSULT-II Reference Value in Data Monitor Mode

EBS003CG

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
TRGT FAN RPM	● Ignition switch: ON (Engine stopped)	0 rpm
	● Engine: Idle	300 - 2,550 rpm
FAN AMP	● Cooling fan is operating.	Approx. 0 - 800 mA

On Board Diagnosis Logic

EBS001A3

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.
Malfunction is detected when cooling fan does not operate properly (Overheat), cooling fan system does not operate properly (Overheat) and engine coolant was not added to the system using the proper filling method.

Possible Cause

EBS001A4

- Harness or connectors
  (The cooling fan speed control circuit is shorted to ground.)
- Cooling fan speed control solenoid valve
- Cooling fan pump
- Cooling fan drive pump
- Cooling fan
- Radiator coolant temperature sensor
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat
- Drive belts

For more information, refer to EC-471, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant following the procedure in the CO-8, "Changing Engine Coolant" . Also, replace the 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-11, "ANTI-FREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

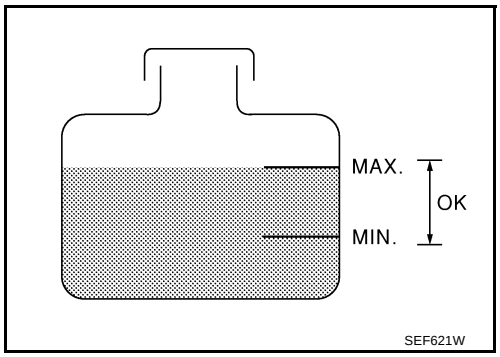
EBS001A5

Use this procedure to check the overall function of the cooling fan. During this check, a 1st trip 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.

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-468, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-468, "Diagnostic Procedure" .
3. Start engine and make sure that the cooling fan operates. If not, go to EC-468, "Diagnostic Procedure" .



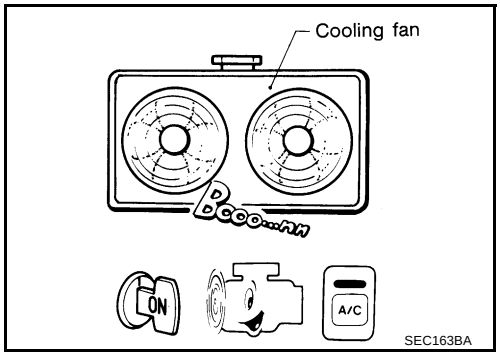
4. Select “TARGET FAN RPM” in “ACTIVE TEST” mode with CONSULT-II.
5. Change “TRGT FAN RPM” indication by touching “UP” and “DOWN”, then make sure that the cooling fan operating speed changes according to “TRGT FAN RPM” indication.
6. If the results are NG, go to EC-468, "Diagnostic Procedure" .

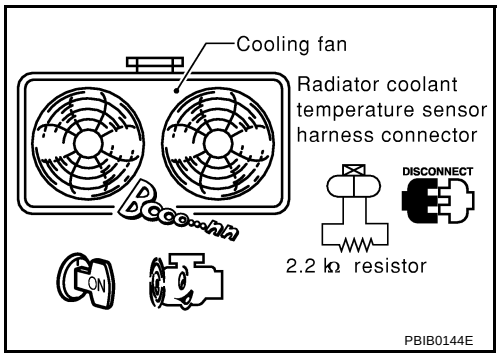
ACTIVE TEST	
TARGET FAN RPM	800.0 rpm
MONITOR	
ENG SPEED	xxx rpm
COOLAN TEMP/S	xxx°C
VHCL SPEED SE	xxxkm/h
AIR COND SIG	ON
AIR COND RLY	ON
RADIATOR TEMP	xxx°C

PBIB0143E

WITHOUT 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-468, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-468, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Make sure that the cooling fan operates. If not, go to EC-468, "Diagnostic Procedure" .
5. Turn ignition switch “OFF”.
6. Disconnect radiator coolant temperature sensor harness connector.
7. Connect 2.2kΩ resistor to engine coolant temperature sensor harness connector.
8. Restart engine and make sure that cooling fan operates at higher speed than the speed at step 4.
   Be careful not to overheat engine.
9. If NG, go to EC-468, "Diagnostic Procedure" .

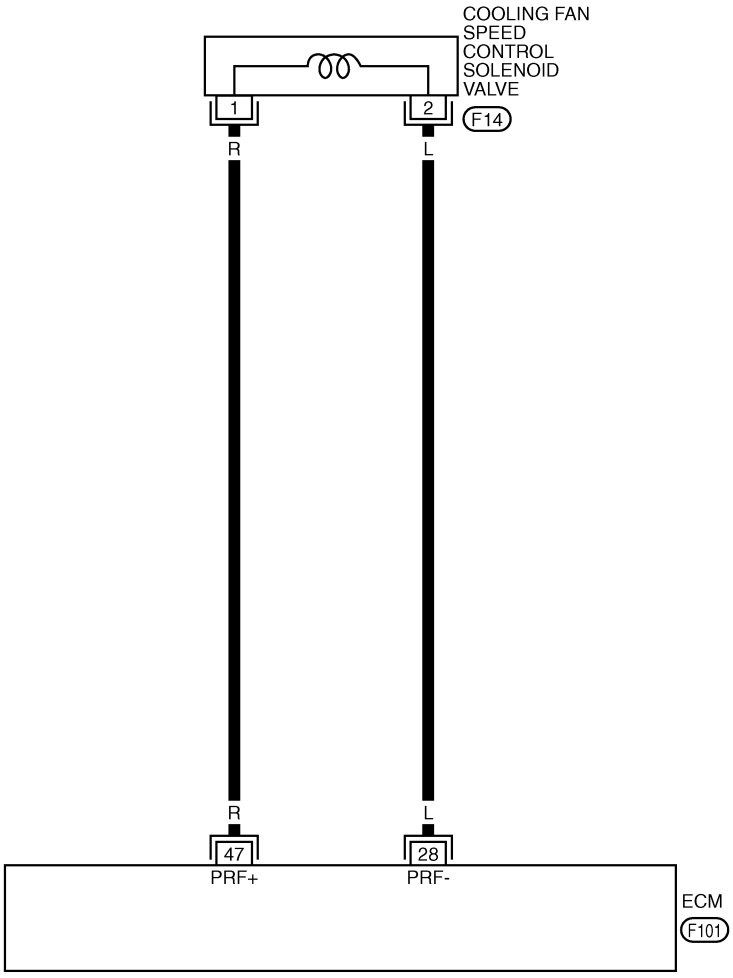


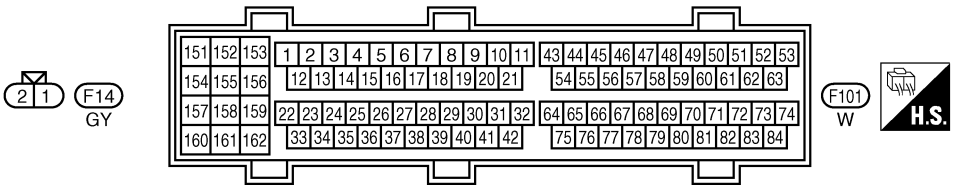


Wiring Diagram

EBS001A6

EC-COOL/V-01

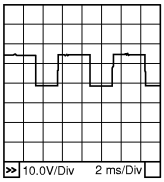




TBWM0048E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	L	Cooling fan speed control solenoid valve ground	**[Engine is running]**	Approximately 0V
47	R	Cooling fan speed control solenoid valve	**[Engine is running]** ● Idle speed	6.5 - 8V★  PBIB0049E

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

Diagnostic Procedure

EBS001A7

1. CHECK COOLING FAN OPERATION-I

Start engine and make sure that cooling fan operates.

OK or NG

OK (With CONSULT-II) >>GO TO 3.
OK (With CONSULT-II) >>GO TO 4.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

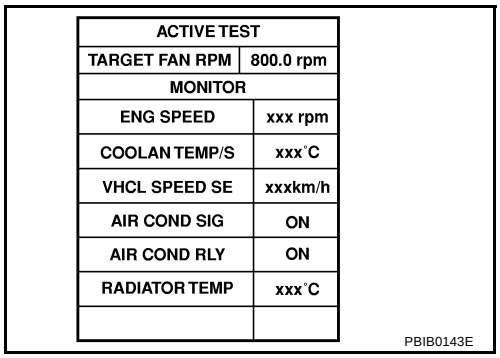
- Cooling fan fluid for leak
- Drive belts (Refer to EM-12, "DRIVE BELTS")
- Cooling fan pump (Refer to CO-17, "COOLING FAN")
- Cooling fan drive pump (Refer to CO-17, "COOLING FAN")

>> Repair or replace.

3. CHECK COOLING FAN OPERATION-II

With CONSULT-II

1. Select “TARGET FAN RPM” in “ACTIVE TEST” mode with CONSULT-II.
2. Change “TRGT FAN RPM” indication by touching “UP” and “DOWN”, then make sure that the cooling fan operating speed changes according to “TRGT FAN RPM” indication.



PBIB0143E

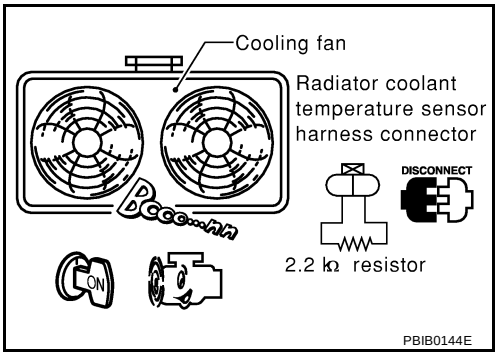
OK or NG

OK >> GO TO 8.
NG >> GO TO 5.

4. CHECK COOLING FAN OPERATION-II

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Disconnect radiator coolant temperature sensor harness connector.
3. Connect 2.2kΩ resistor to radiator coolant temperature sensor connector.
4. Start engine.
5. Make sure that cooling fan operates at higher speed than the speed at test No. 1.



OK or NG

OK >> GO TO 8.
NG >> GO TO 5.

5. CHECK COOLING FAN SPEED CONTROL SOLENOID VALVE CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground in harness or connectors.

6. CHECK COOLING FAN SPEED CONTROL SOLENOID VALVE

Refer to EC-539, "Component Inspection"

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan speed control solenoid valve.

7. DETECT MALFUNCTIONING PART

Check the following.

- Cooling fan fluid for leak
- Drive belts (Refer to EM-12, "DRIVE BELTS")
- Cooling fan pump (Refer to CO-17, "COOLING FAN")
- Cooling fan drive pump (Refer to CO-17, "COOLING FAN")

>> Repair or replace.

8. CHECK RADIATOR COOLANT TEMPERATURE SENSOR

Refer to EC-439, "Component Inspection" .

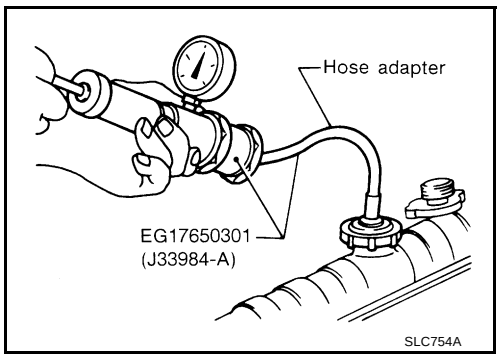
OK or NG

OK >> GO TO 9.
NG >> Replace radiator coolant temperature sensor.

9. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)



CAUTION:
Higher than the specified pressure may cause radiator damage.
Pressure should not drop.

OK or NG

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

10. DETECT MALFUNCTIONING PART

Check the following for leak.

- Radiator
- Hose
- Water pump (Refer to CO-21, "WATER PUMP")

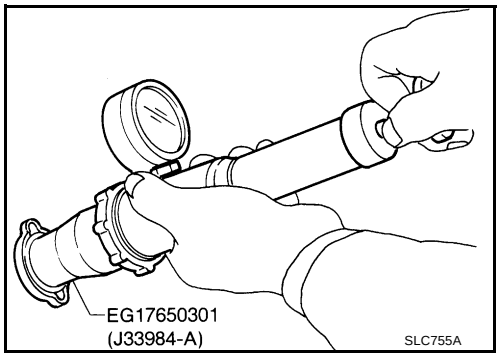
>> Repair or replace.

11. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



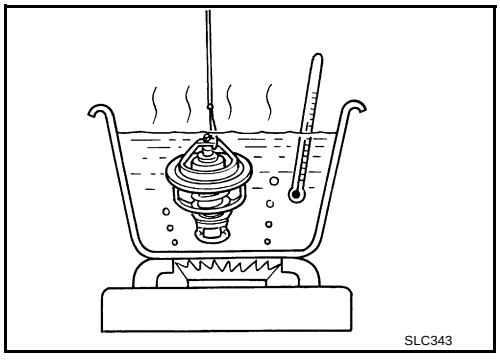
OK or NG

OK >> GO TO 12.
NG >> Replace radiator cap.

12. 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:	**82°C (180°F) [standard]**
Valve lift:	**More than 10.0 mm/95°C (0.394 in/203°F)**



4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

OK or NG

OK >> GO TO 13.
NG >> Replace thermostat.

13. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-177, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace engine coolant temperature sensor.

14. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-471, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

Main 12 Causes of Overheating

EBS001AA

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-10, "RECOMMENDED FLUIDS AND LUBRICANTS" ,
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-8, "Changing Engine Coolant" ,
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See LU-4, "LUBRICATION SYSTEM" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See LU-4, "LUBRICATION SYSTEM" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-23, "THERMOSTAT AND WATER CONTROL VALVE" , and CO-11, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-464).
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-8, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-12, "ENGINE MAINTENANCE" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-55, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-67, "CYLINDER BLOCK" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 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-5, "OVERHEATING CAUSE ANALYSIS" .

DTC P1220 FUEL PUMP CONTROL MODULE (FPCM)

PFP:17001

Description

EBS002PV

SYSTEM DESCRIPTION

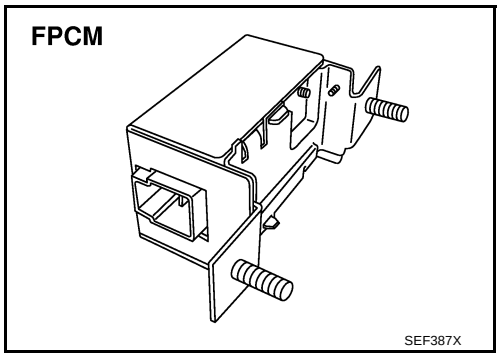
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump control module (FPCM)
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		

This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage supplied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
● Engine cranking ● Engine coolant temperature is below 10°C (50°F). ● Engine is running under heavy load and high speed conditions	high	Battery voltage (11 - 14V)
Except the above	low	Approximately 8V

COMPONENT DESCRIPTION

The FPCM adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is increased. When the FPCM decreases the voltage, the fuel flow is decreased.



CONSULT-II Reference Value in Data Monitor Mode

EBS002PW

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FPCM	● When cranking engine	HI
	● Idle at coolant temperatures above 10°C (50°F)	LOW

On Board Diagnosis Logic

EBS002PX

Malfunction is detected when an improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM.

Possible Cause

EBS002PY

- Harness or connectors
  (FPCM circuit is shorted.)
- Dropping resistor
- FPCM

DTC Confirmation Procedure

EBS002PZ

CAUTION:
Always drive vehicle at a safe speed.

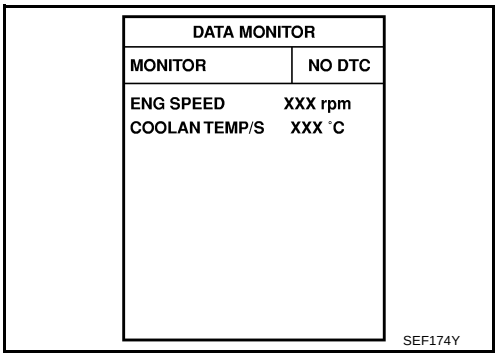
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.0V with ignition switch “ON”.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure that “COOLAN TEMP/S” indicates less than 70°C (158°F). If not, cool down the engine.
3. Start engine.
4. Hold vehicle at the following conditions for 12 seconds.

ENG SPEED	1,100 - 2,450 rpm
VHCL SPEED SE	More than 70 km/h (43 MPH)
B/FUEL SCHDL	1 - 10 msec
Selector lever	Suitable position



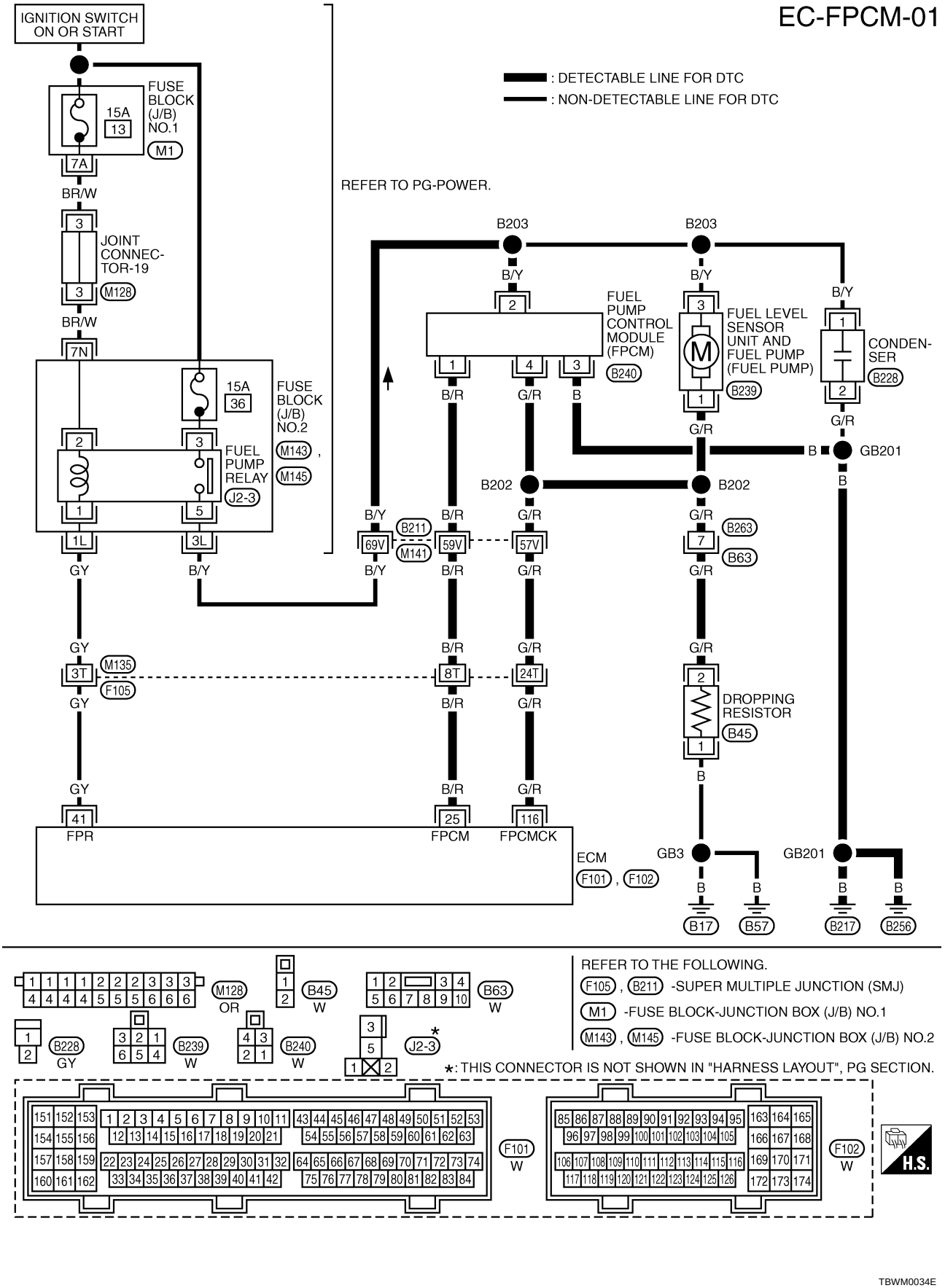
5. If 1st trip DTC is detected, go to EC-475, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002Q0



TBWM0034E

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

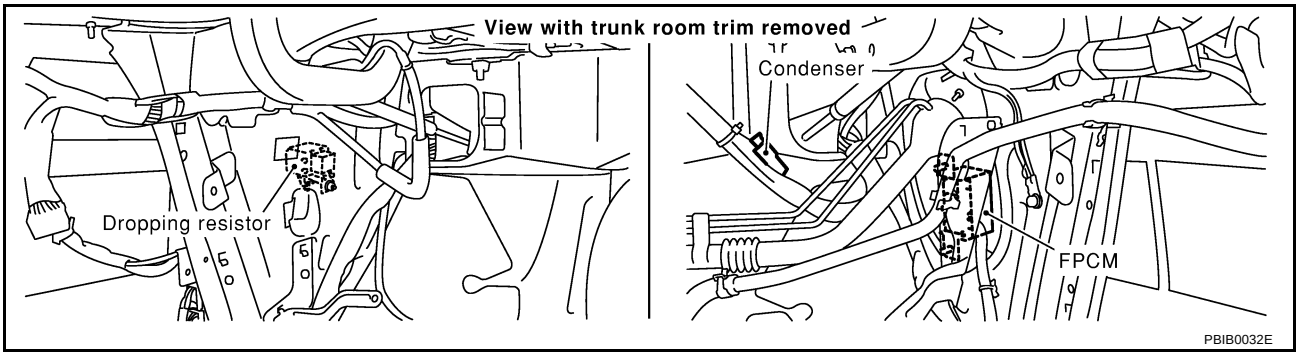
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	B/R	Fuel pump control module	**[When cranking engine]**	0 - 0.5V
			[Engine is running] ● **Warm-up condition** ● Idle speed	8 - 12V
41	GY	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
116	G/R	Fuel pump control module check	**[Engine is running]** ● More than 5seconds after turning ignition switch "ON"	Approximately 0V
			[Ignition switch "ON"] ● For 5 seconds after turning ignition switch "ON" **[Engine is running]** ● **Warm-up condition** ● Idle speed	4 - 6V

Diagnostic Procedure

EBS002Q1

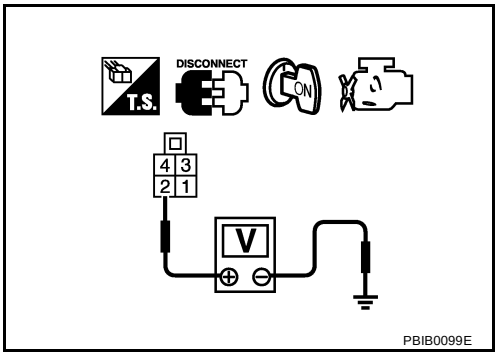
1. CHECK FPCM POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect FPCM harness connector.



3. Turn ignition switch "ON".
4. Check voltage between FPCM terminal 2 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 M141, B211
- Harness for open or short between FPCM and harness connector B211

>> Repair harness or connectors.

3. CHECK FPCM GROUND CIRCUIT-I FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between FPCM terminal 3 and body ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK FPCM GROUND CIRCUIT-II FOR OPEN AND SHORT

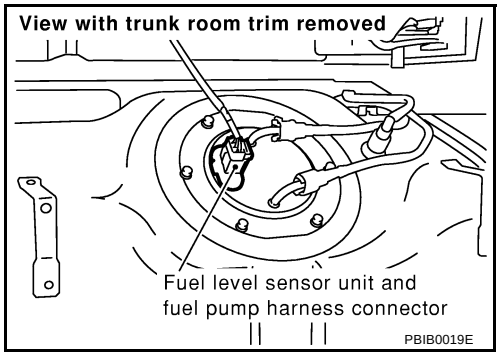
1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Disconnect dropping resistor harness connector.
3. Check harness continuity between fuel level sensor and fuel pump terminal 1 and dropping resistor terminal 2, FPCM terminal 4 and dropping resister terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Check harness continuity between FPCM terminal 4 and ground, fuel level sensor and fuel pump terminal 1 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. 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 B63, B263
- Harness for open or short between fuel pump and body ground
- Harness for open or short between FPCM and dropping resistor

>> Repair harness or connectors.

6. CHECK FPCM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 116 and FPCM terminal 4. Refer to Wiring Diagram.

Continuity should exist.

3. Check harness continuity between ECM terminal 116 and ground. Refer to Wiring Diagram.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Harness connectors M141, B211
- Harness for open or short between ECM and FPCM

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

8. CHECK FPCM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 25 and FPCM terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Harness connectors M141, B211
- Harness for open or short between ECM and FPCM

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

10. CHECK FPCM

Refer to EC-478, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace FPCM.

11. CHECK INTERMITTENT INCIDENT

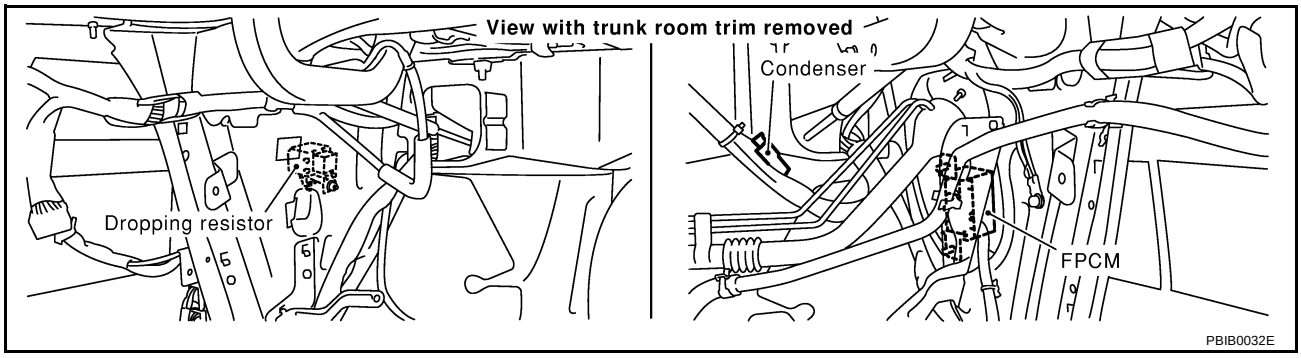
Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

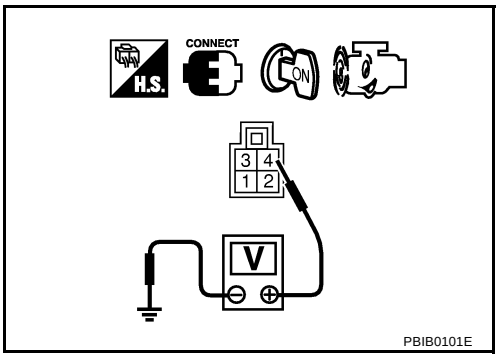
EBS002Q2

FUEL PUMP CONTROL MODULE



1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Check voltage between FPCM terminal 4 and body ground under the following conditions.

Condition	Voltage
When engine cranking	Approx. 0V
After starting engine	Approx. 5V



4. If NG, replace fuel pump control module.

DTC P1320 IGNITION SIGNAL

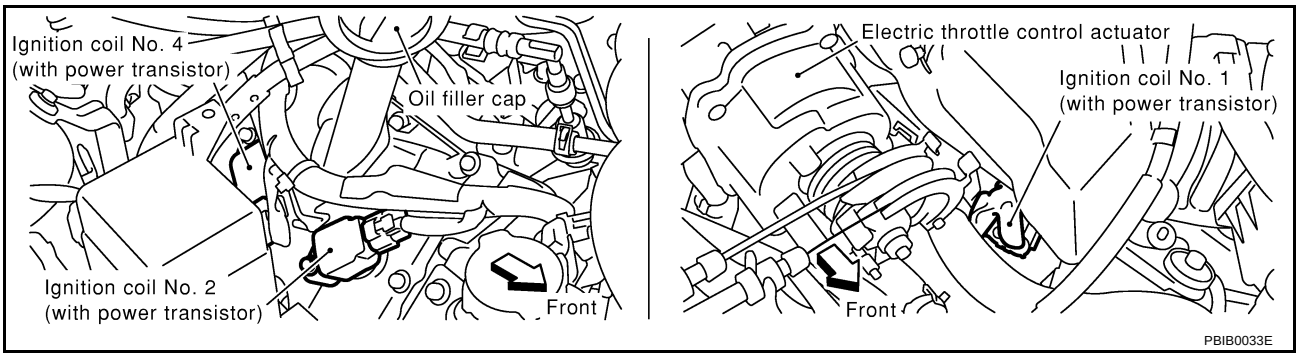
PFP:22448

Component Description

EBS001AB

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.



On Board Diagnosis Logic

EBS001AD

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

EBS001AE

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (POS)
- Crankshaft position sensor (POS) circuit
- Camshaft position sensor (PHASE)
- Camshaft position sensor (PHASE) circuit

DTC Confirmation Procedure

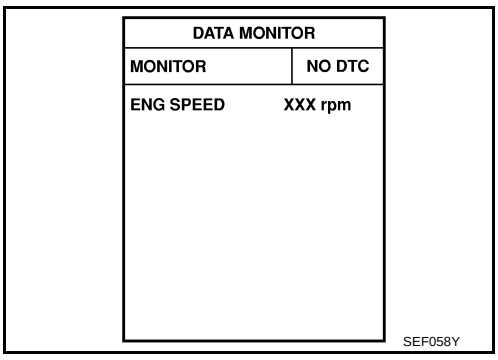
EBS001AF

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.
- **If DTC P1320 is displayed with DTC P0335, P0340 or P1336, perform trouble diagnosis for DTC P0335, P0340 or P1336 first. Refer to EC-331 , EC-340 or EC-490 .**

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
4. If 1st trip DTC is detected, go to EC-485, "Diagnostic Procedure" .

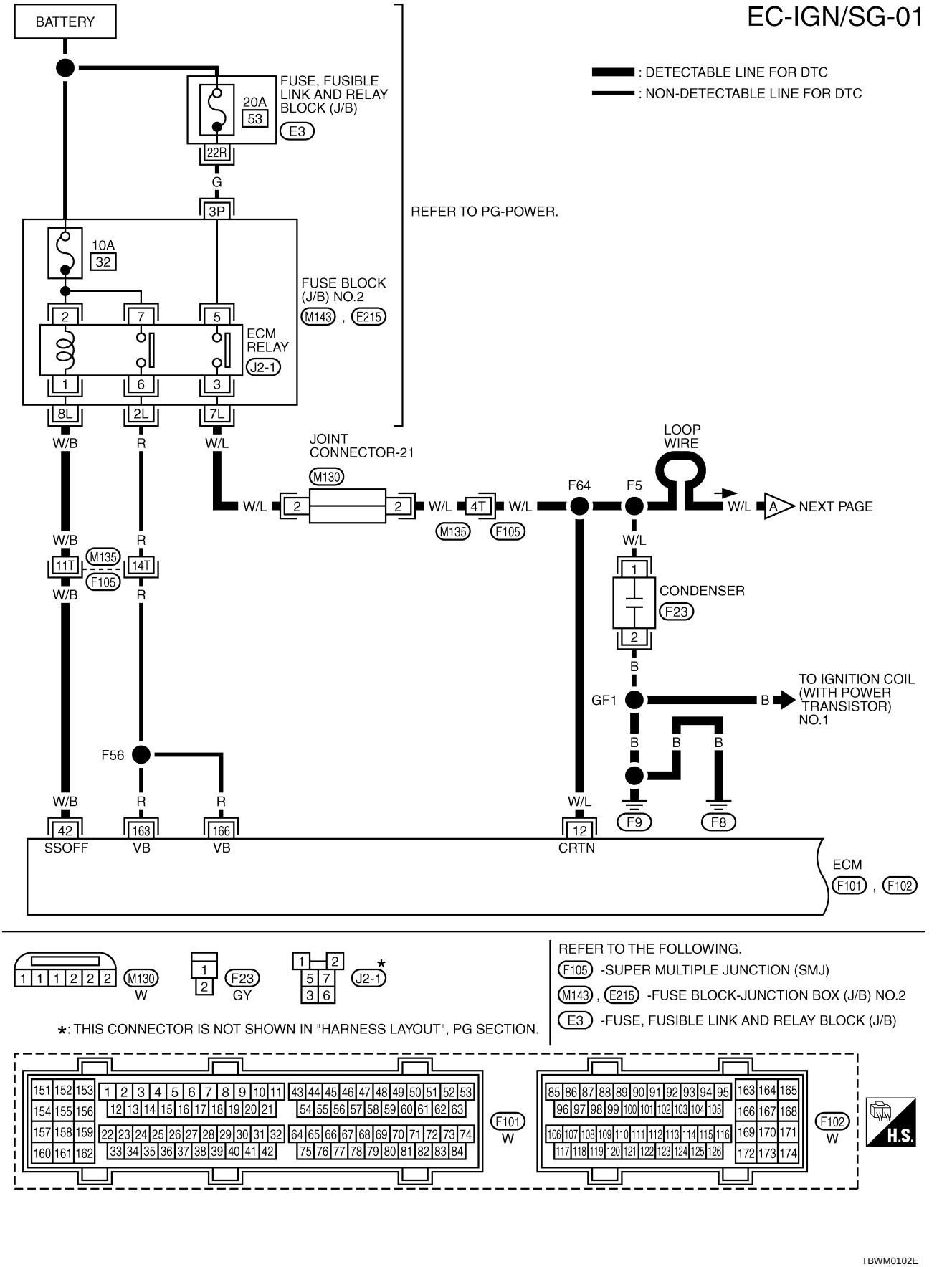


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS001AG



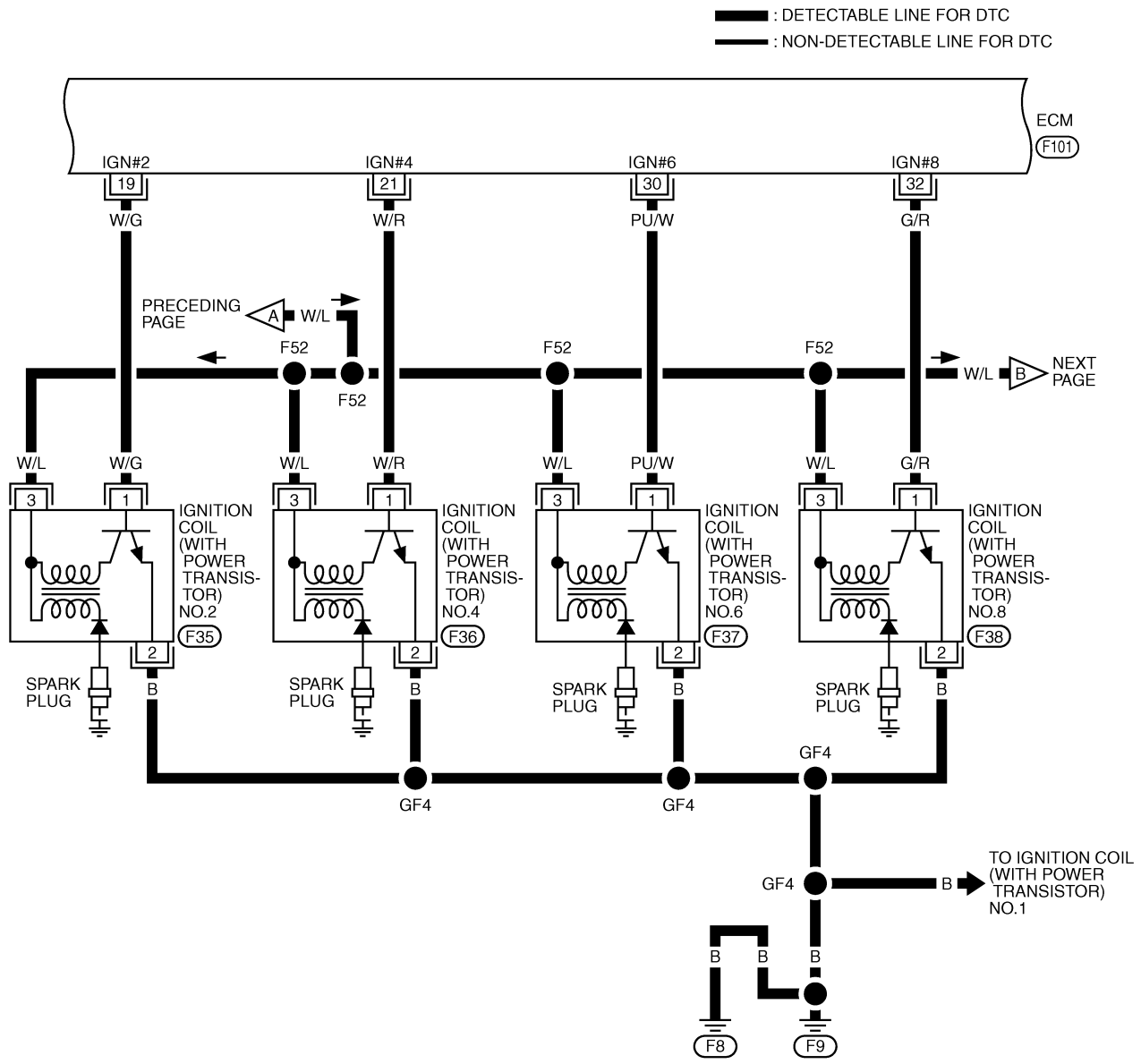
TBWM0102E

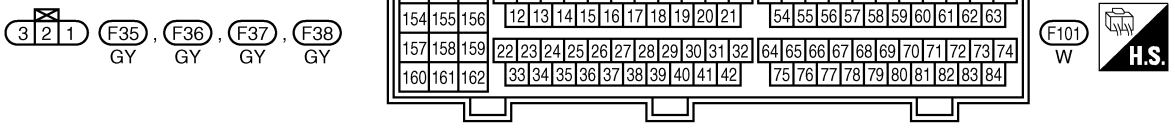
Specification data are reference values and are measured between each terminal and body ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	W/L	Counter current return	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
42	W/B	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)
163 166	R R	Power supply for ECM	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)

EC-IGN/SG-02

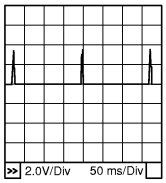
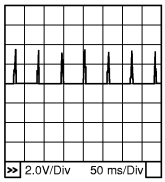




TBWM0103E

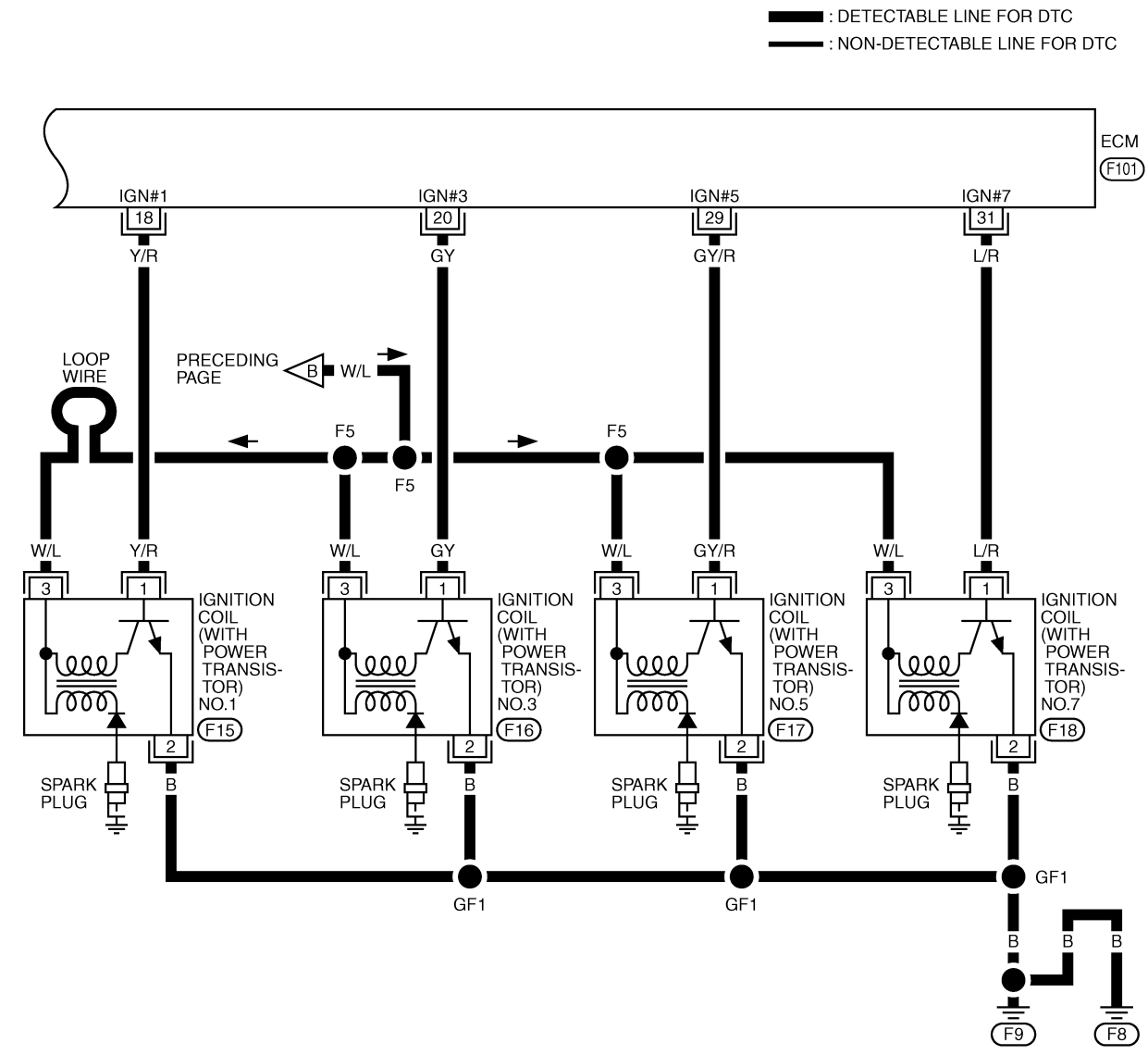
Specification data are reference values and are measured between each terminal and body ground.

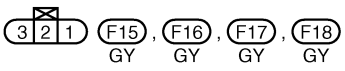
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

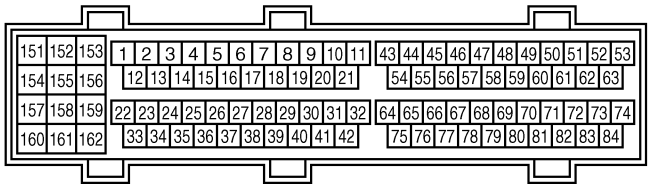
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19 21 30 32	W/G W/R PU/W G/R	Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 6 Ignition signal No. 8	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0044E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0045E

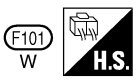
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGN/SG-03





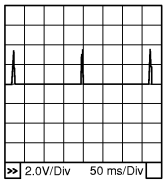
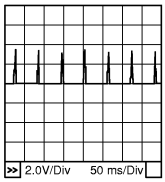




TBWM0037E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18 20 29 31	Y/R GY GY/R L/R	Ignition signal No. 1 Ignition signal No. 3 Ignition signal No. 5 Ignition signal No. 7	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0044E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0045E

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

Diagnostic Procedure

EBS001AH

1. CHECK ENGINE START

Turn ignition switch “OFF”, and restart engine.
Is engine running?

Yes or No

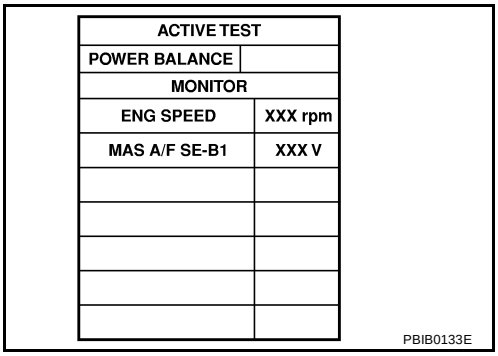
Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 12.
No >> GO TO 3.

2. SEARCH FOR MALFUNCTIONING CIRCUIT

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Search for circuit which does not produce a momentary engine speed drop.

>> GO TO 12.



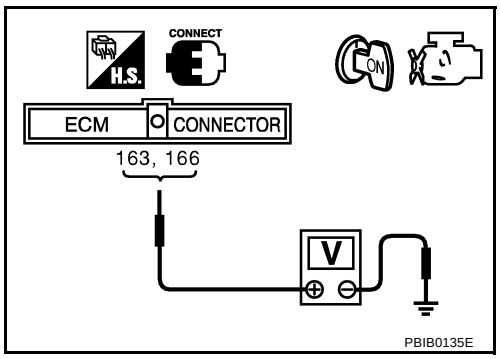
3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 163, 166 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> Go to EC-143, "POWER SUPPLY CIRCUIT FOR ECM"
.



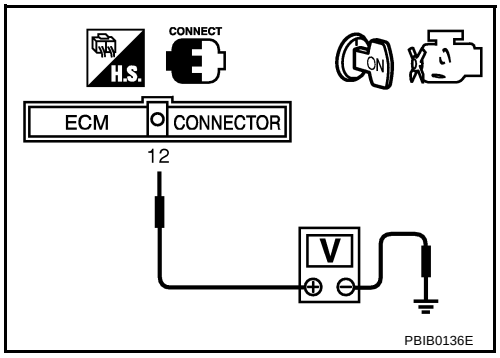
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

Check voltage between ECM terminal 12 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

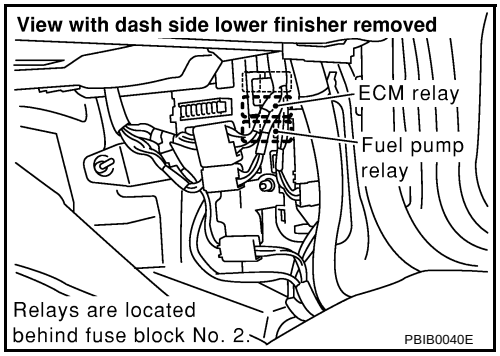
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect ECM relay.
4. Check harness continuity between ECM terminal 12 and ECM relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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



6. DETECT MALFUNCTIONING PART

Check the following.

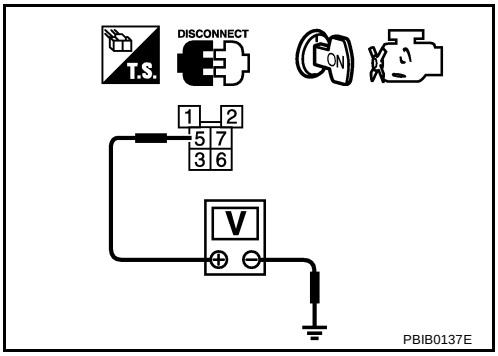
- Harness connectors M135, F105
- Joint connector-21
- Fuse block (J/B) No. 2 harness connector M143
- Harness for open or short between ECM and ECM relay

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

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- Fuse, fusible link and relay block (J/B) harness connector E3
- Fuse block (J/B) No. 2 harness connector E215
- Harness for open and short between ECM relay and fuse

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-150, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between ECM terminal 12 and condenser terminal 1, condenser terminal 2 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 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK CONDENSER

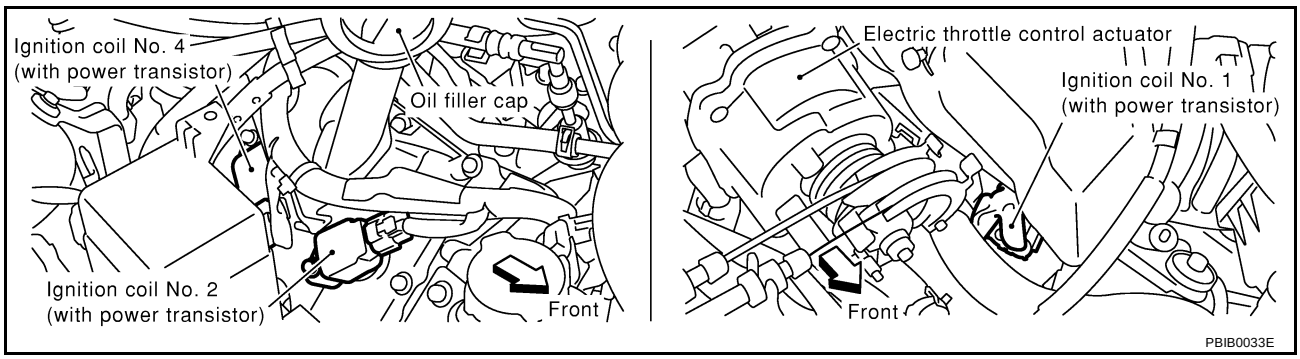
Refer to EC-489, "Component Inspection"

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

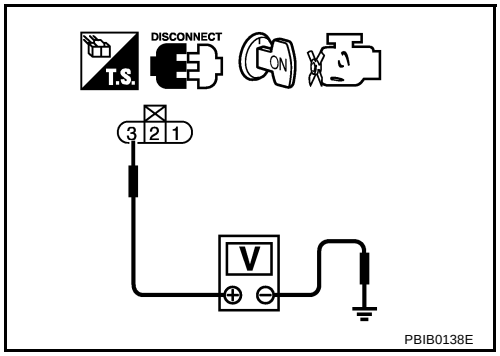
12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

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 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the harness for open or short between ignition coil and harness connector F105.

>> Repair or replace harness or connectors.

14. 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 ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 18, 19, 20, 21, 29, 30, 31, 32 and ignition coil terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-489, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

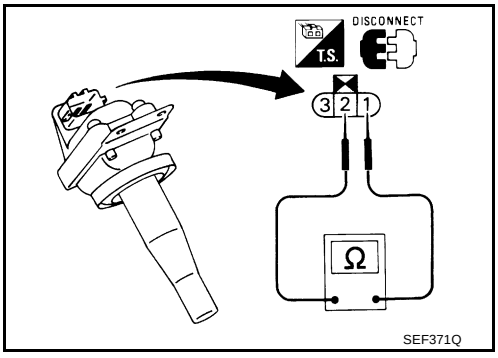
Component Inspection

EBS001AI

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.

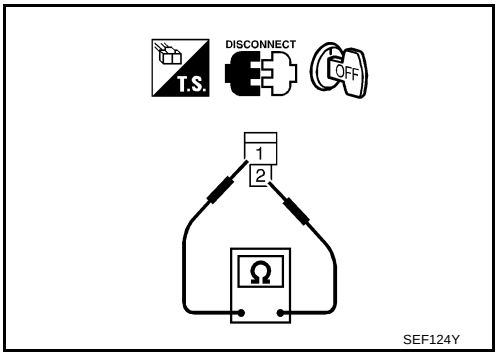
Terminal No.	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	



CONDENSER

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as 1 and 2.

Resistance	Above 1 MΩ at 25°C (77°F)



Removal and Installation

EBS001AJ

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-28, "IGNITION COIL" .

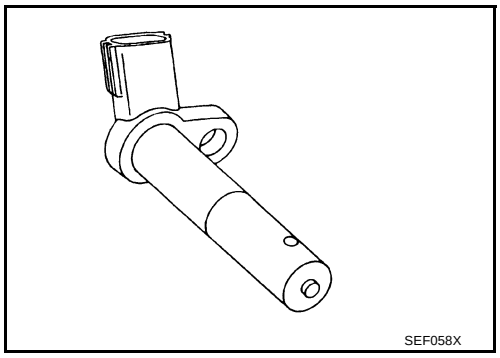
DTC P1336 CRANKSHAFT POSITION (CKP) SENSOR (POS) (COG)

PFP:23731

Component Description

EBS003CD

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 to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


SEF058X

CONSULT-II Reference Value in Data Monitor Mode

EBS003CE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED·	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

On Board Diagnosis Logic

EBS002LM

Malfunction is detected when chipping of the signal plate (drive plate) gear tooth (cog) is detected by the ECM.

Possible Cause

EBS002LN

- Harness or connectors
- Crankshaft position sensor (POS)
- Signal plate (Drive plate)

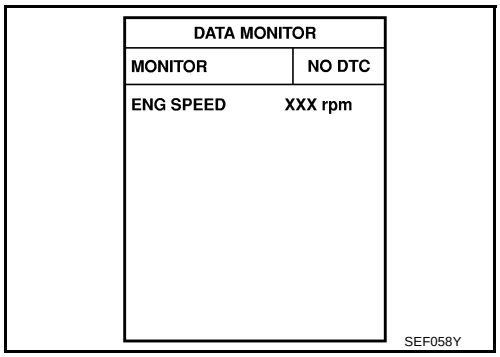
DTC Confirmation Procedure

EBS002LO

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 CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 70 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-494, "Diagnostic Procedure" .



SEF058Y

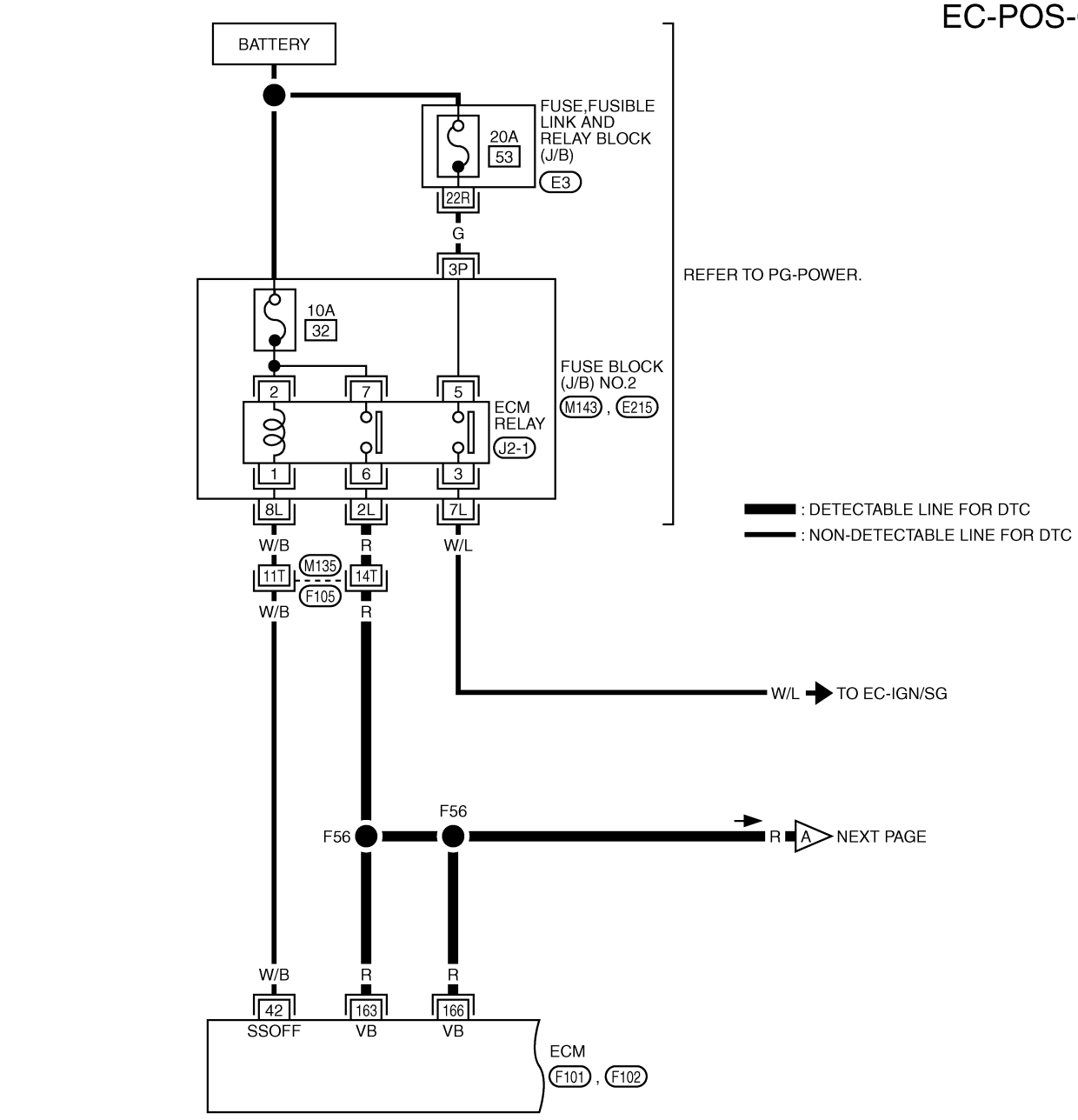
WITH GST

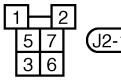
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS002LP

EC-POS-01





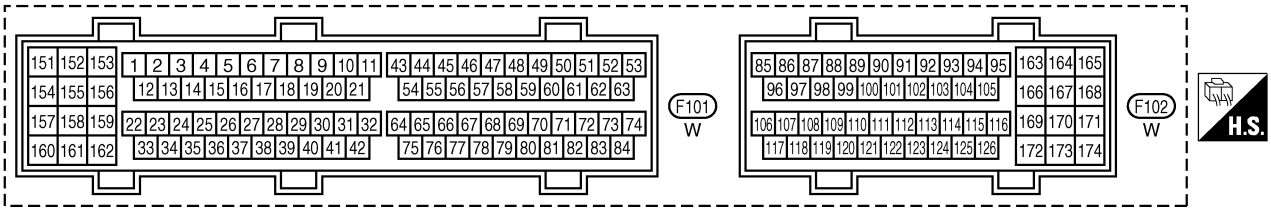
*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M143 , E215 -FUSE BLOCK-JUNCTION BOX (J/B) NO.2

E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

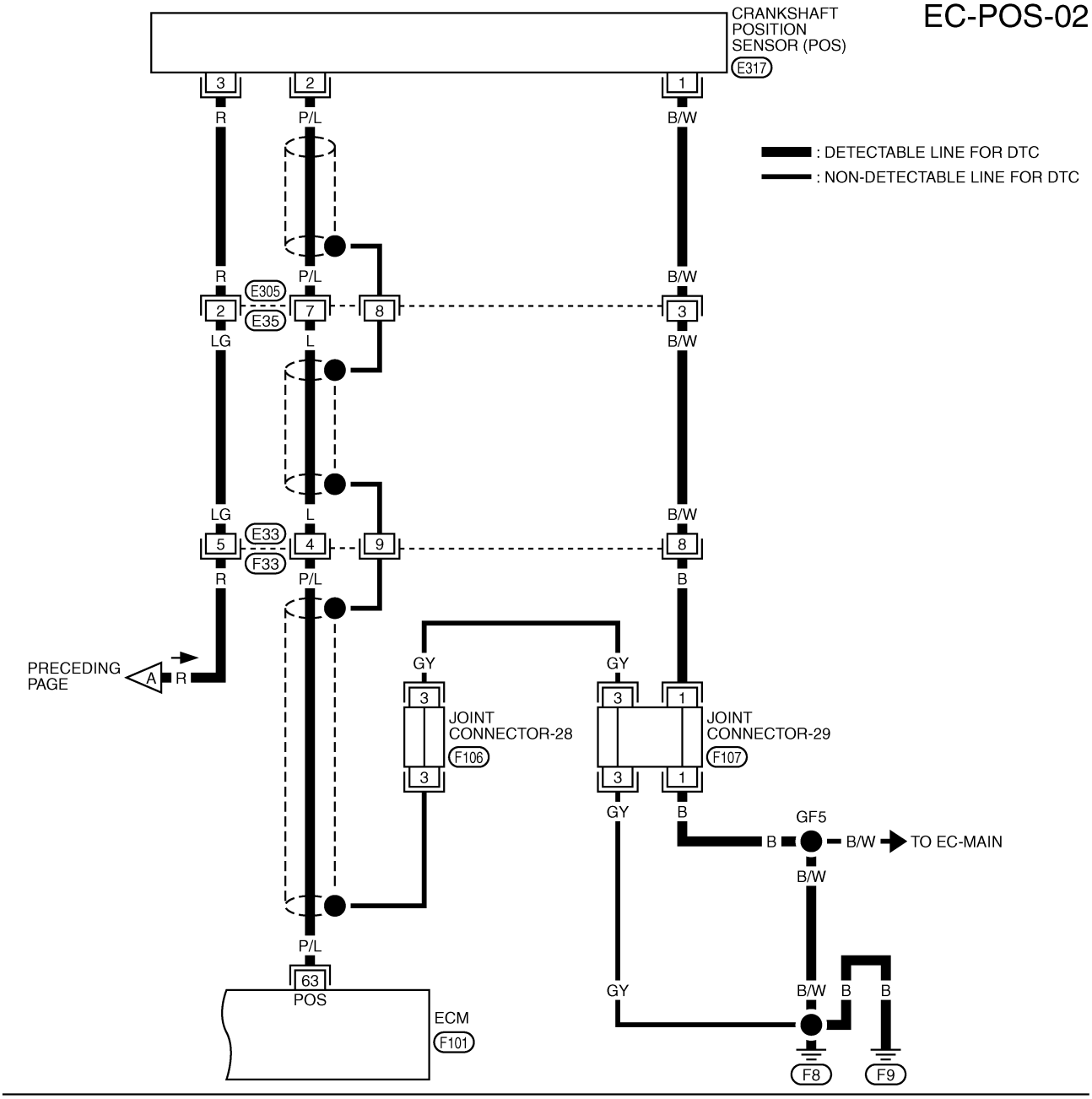


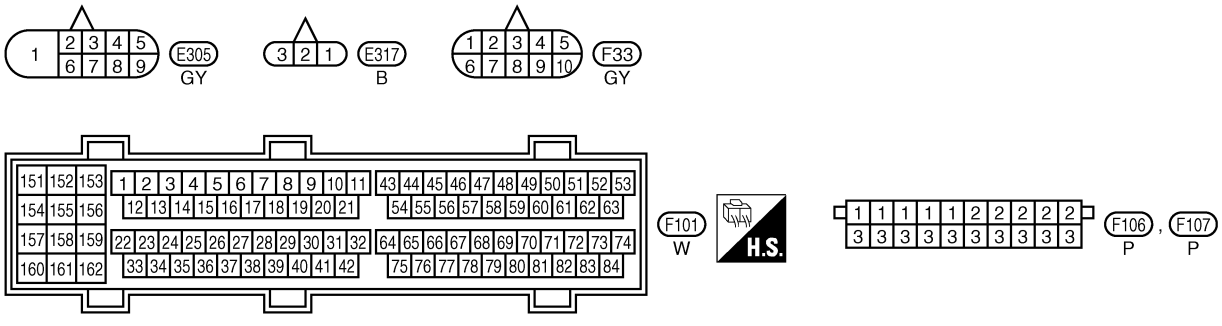
TBWM0023E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	W/B	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)
163 166	R R	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

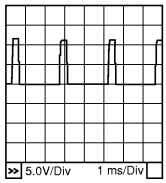
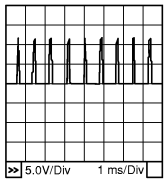




TBWM0110E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	P/L	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 2.0V★  PBIB0052E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 2.0V★  PBIB0053E

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

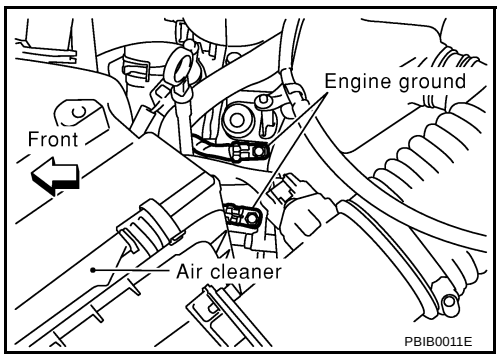
Diagnostic Procedure

EBS002LQ

1. RETIGHTEN GROUND SCREWS

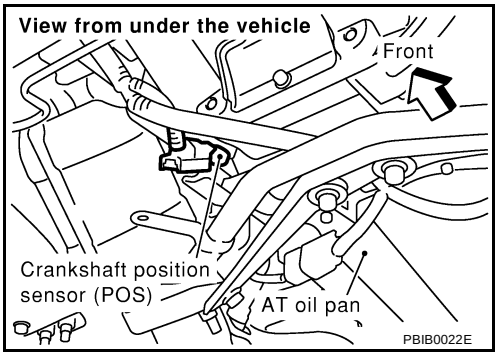
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch “ON”.



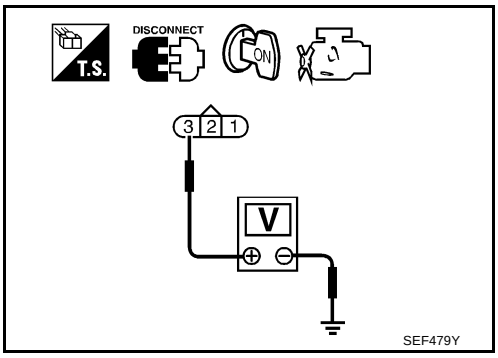
3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

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 E305, E35
- Harness connectors E33, F33
- Harness connectors F105, M135
- Harness for open or short between ECM and crankshaft position sensor (POS)
- Harness for open or short between ECM relay and crankshaft position sensor (POS)

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between CKP sensor (POS) terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors E33, F33
- Joint connector-29
- Harness for open or short between crankshaft position sensor (POS) and engine ground

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

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 63 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors E33, F33
- Harness for open or short between crankshaft position sensor (POS) and ECM

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

8. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-497, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace crankshaft position sensor (POS).

9. CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors E35, E305.
2. Check harness continuity between harness connector E35 terminal 8 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E305, E35
- Harness connectors F33, E33
- Joint connector-28
- Joint connector-29
- Harness for open or short between harness connector E35 and engine ground

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

11. CHECK GEAR TOOTH

Visually check for chipping signal plate (drive plate) gear tooth (cog).

OK or NG

OK >> GO TO 12.
NG >> Replace the signal plate (drive plate).

12. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

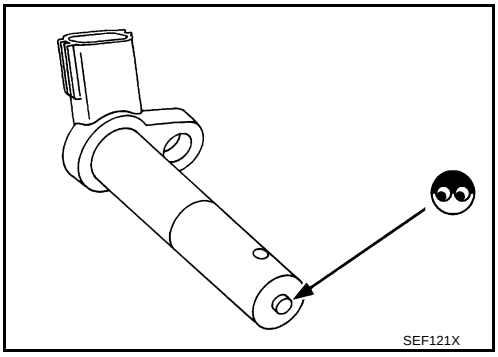
>> **INSPECTION END**

Component Inspection

EBS002LR

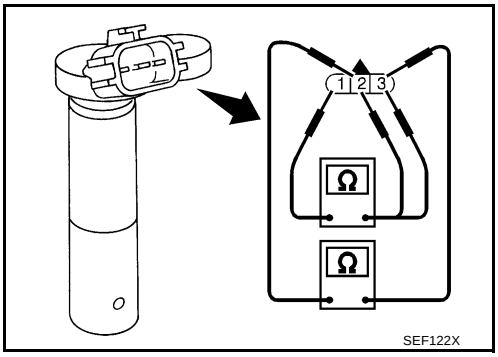
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
2 (+) - 1 (-)	
3 (+) - 2 (-)	



Removal and Installation

EBS002LS

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-67, "CYLINDER BLOCK" .

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

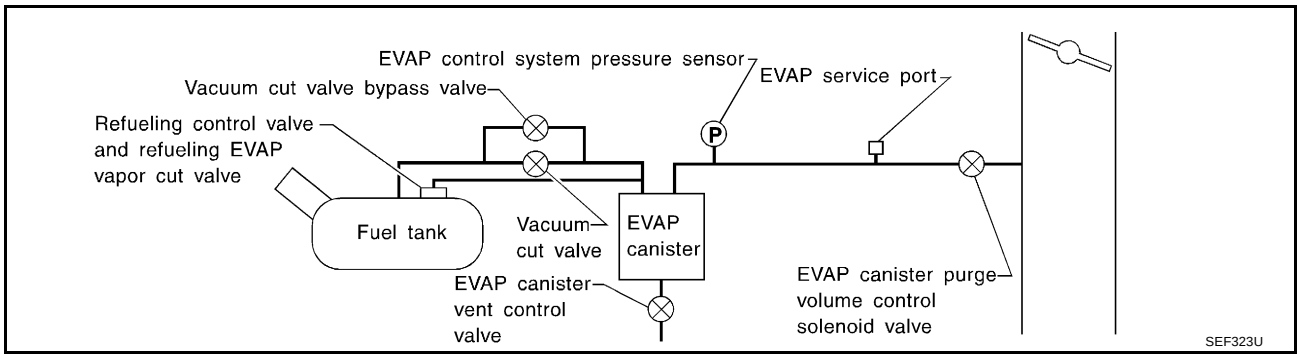
PFP:14950

On Board Diagnosis Logic

EBS001BH

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-522, "DTC P1448 EVAP CANISTER VENT CONTROL VALVE (OPEN)" .)

This diagnosis detects leaks in the EVAP purge line using vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

EBS001BI

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve

- ORVR system leaks

DTC Confirmation Procedure

EBS001BJ

Refer to “P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)”, EC-350 .

Diagnostic Procedure

EBS001BK

Refer to “P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)”, EC-350 .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

EBS001BL

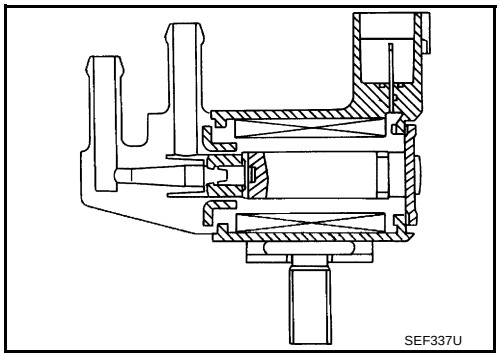
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Accelerator pedal position switch	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed signal (CAN communication line)	Vehicle speed		

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

EBS001BM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch “OFF” ● Shift lever: “N” ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

EBS001BN

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

EBS001BO

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve

- EVAP canister
- Hoses
  (Hoses are connected incorrectly or clogged.)

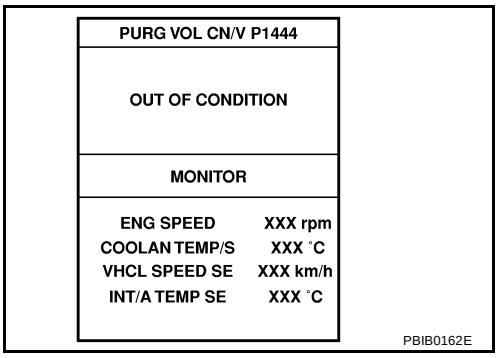
DTC Confirmation Procedure

EBS001BP

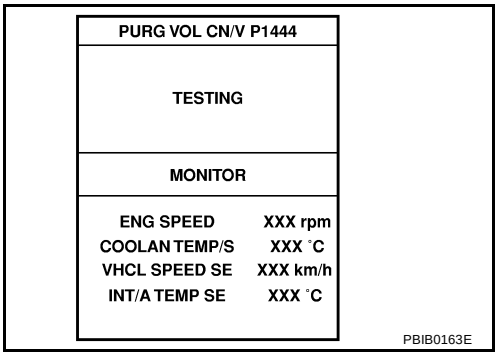
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

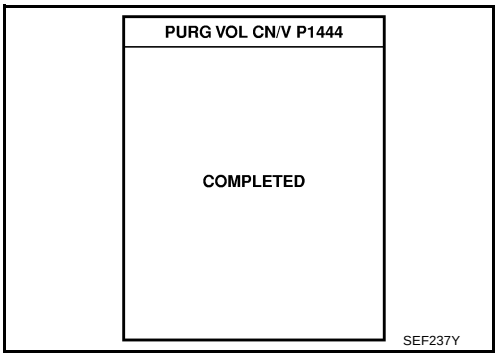
WITH CONSULT-II

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 “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.



6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take approximately 10 seconds.)
   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 “Diagnostic Procedure”, EC-504 .

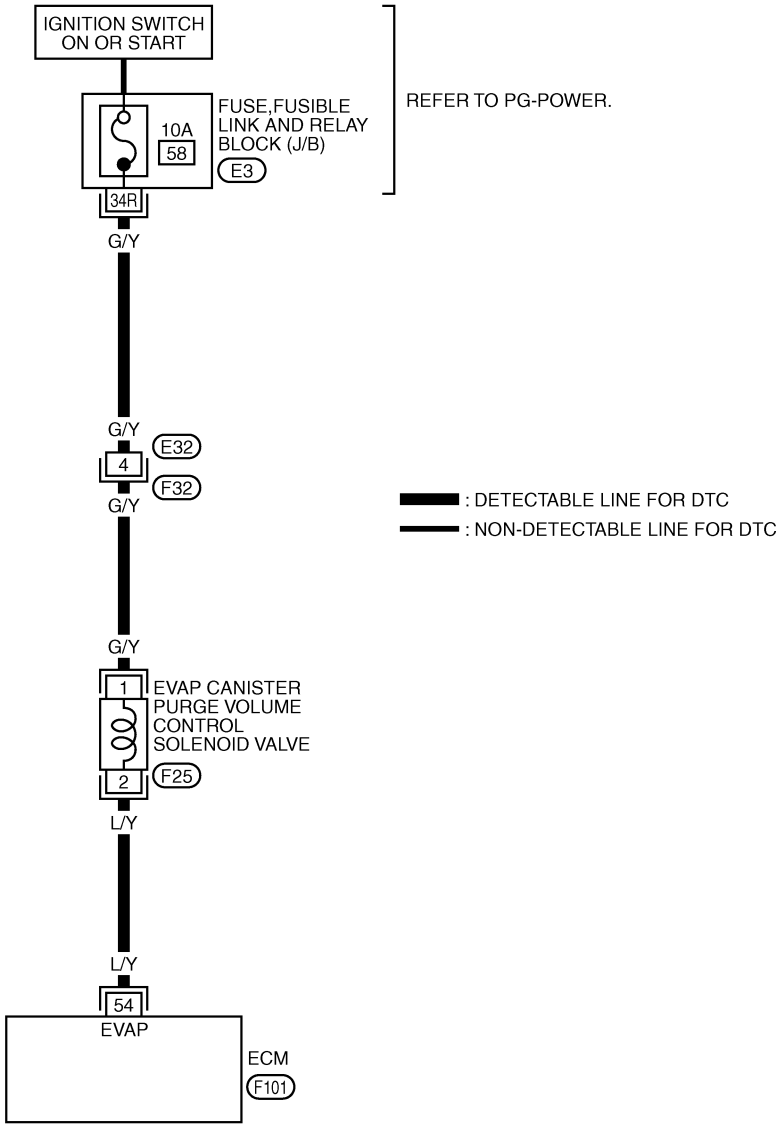
WITH GST

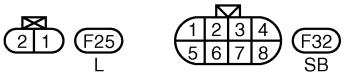
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-504 .

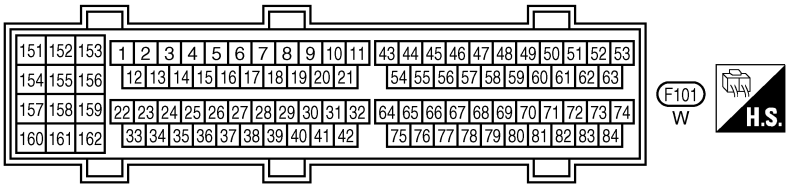
Wiring Diagram

EBS001BQ

EC-PGC/V-01





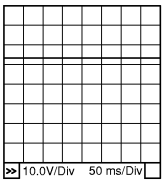
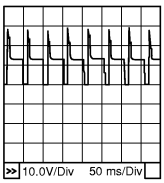


REFER TO THE FOLLOWING.
E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0039E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	L/Y	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).	BATTERY VOLTAGE (11 - 14V)★  PBIB0051E

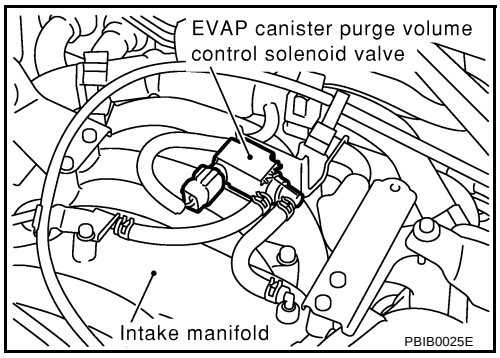
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS001BR

1. 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”.



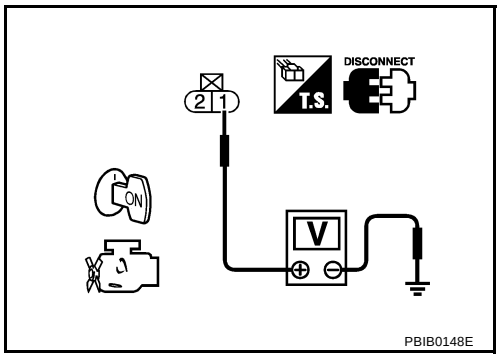
PBIB0025E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



PBIB0148E

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E32, F32
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

>> 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 54 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 >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to “Component Inspection”, EC-380 .

OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. 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	0 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB0147E

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to “Component Inspection”, EC-507 .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to “Component Inspection”, EC-371 .

OK or NG

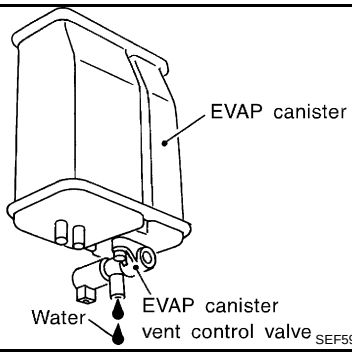
OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 12.
No >> GO TO 15.



SEF596U

12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK WATER SEPARATOR

Refer to “Component Inspection”, EC-359 .

OK or NG

OK >> GO TO 15.
NG >> Clean or replace water separator.

15. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Component Inspection

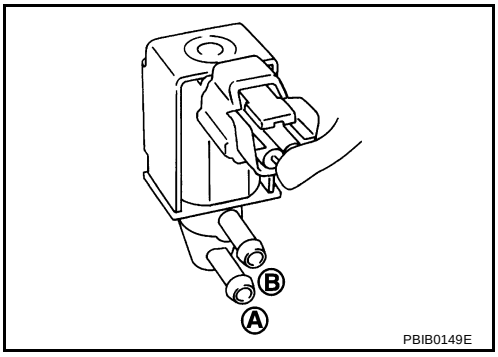
EBS001BS

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

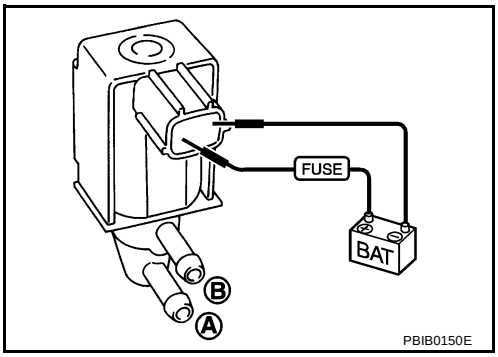
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100.0%	Yes
0.0%	No



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

EBS001BT

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-17, "INTAKE MANIFOLD" .

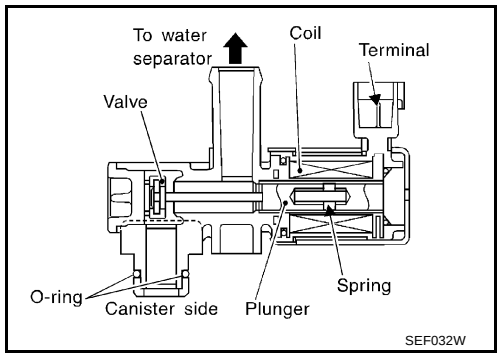
DTC P1446 EVAP CANISTER VENT CONTROL VALVE (CLOSE)

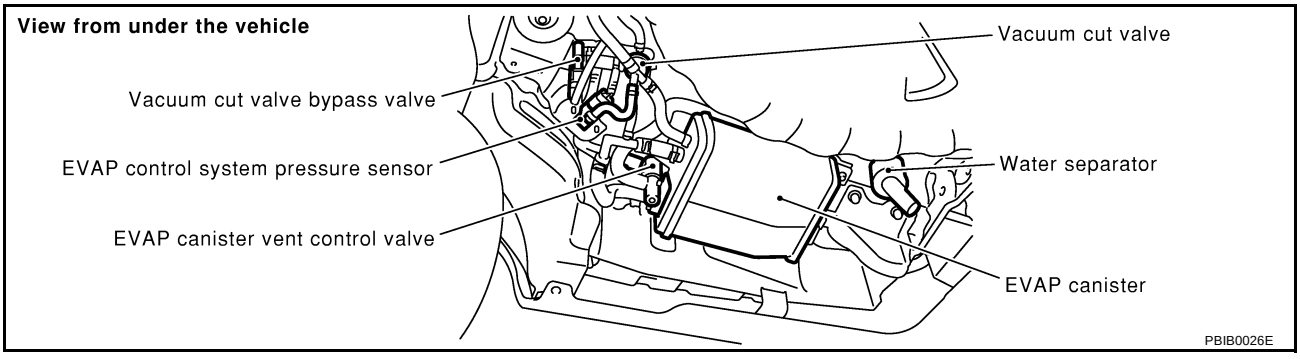
PFP:14935

Component Description

EBS001BU

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System (Small Leak)” diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

EBS001BV

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

EBS001BW

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

EBS001BX

- EVAP canister vent control valve
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.

DTC Confirmation Procedure

EBS001BY

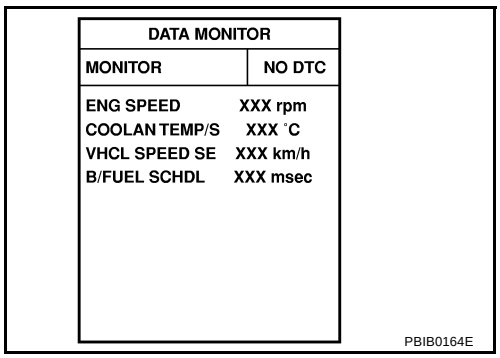
CAUTION:
Always drive vehicle at a safe speed.

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”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.

4. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
   NOTE:
   If a malfunction exists, NG result may be displayed quicker.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-512
   .



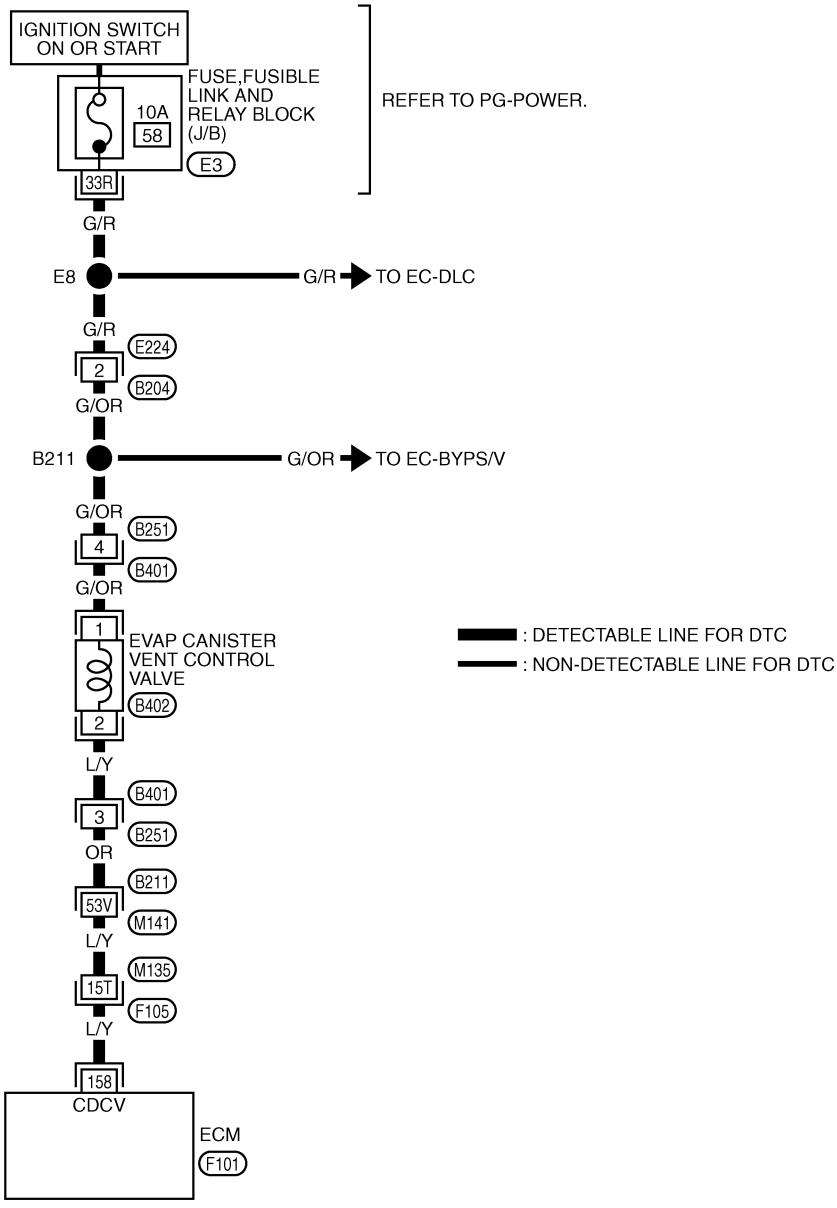
WITH GST

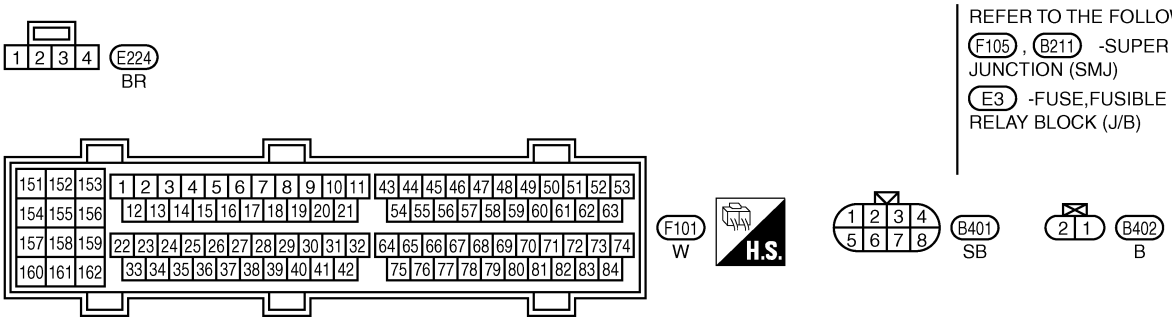
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS001BZ

EC-VENT/V-01





TBWM0025E

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

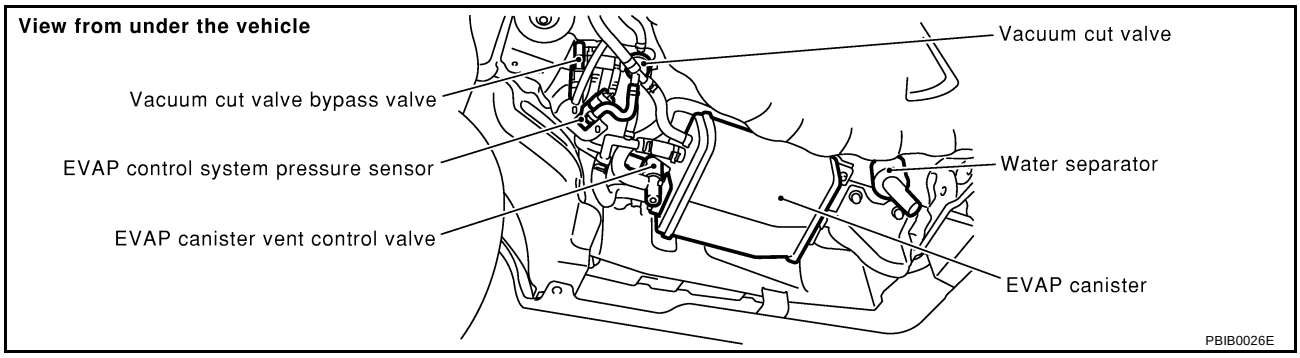
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
158	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS001C0

1. CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.



3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2. CHECK WATER SEPARATOR

Refer to “Component Inspection”, EC-359 .

OK or NG

OK >> GO TO 3.
NG >> Clean or replace water separator.

3. CHECK EVAP CANISTER VENT CONTROL VALVE

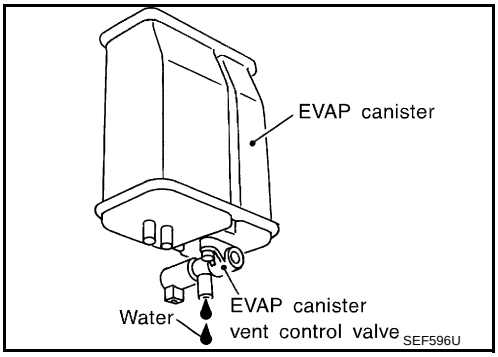
Refer to “Component Inspection”, EC-514 .

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 5.
No >> GO TO 7.

5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to “Component Inspection”, EC-380 .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

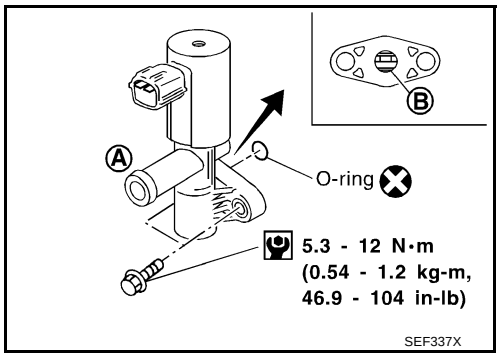
Component Inspection

EBS001C1

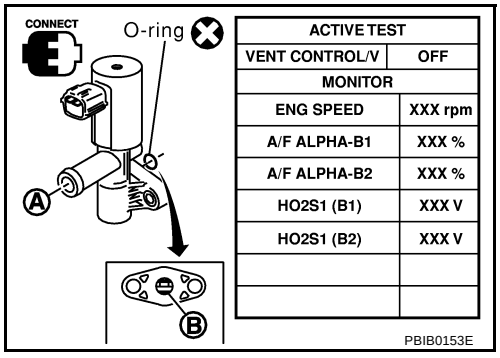
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.
5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

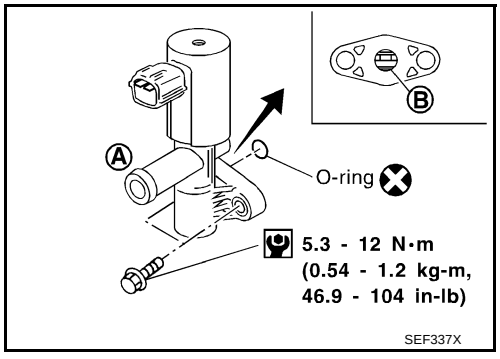


6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 9 again.

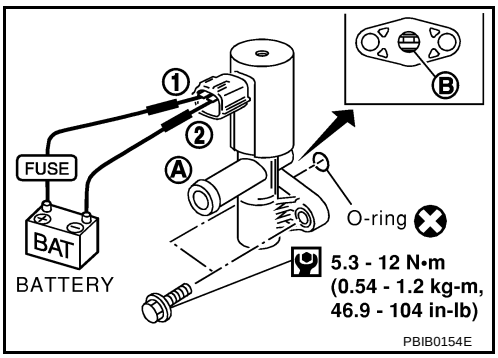


With GST

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 9 again.



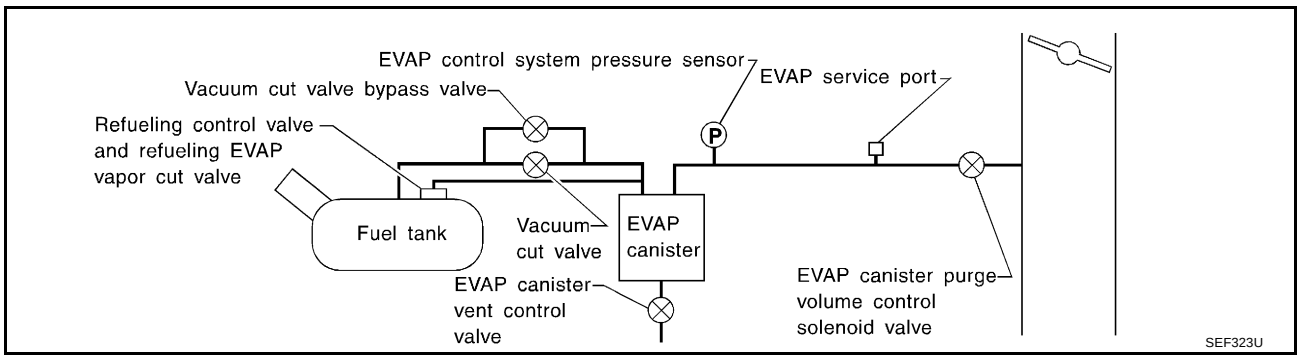
DTC P1447 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

PFP:14920

System Description

EBS001C3

NOTE:
If DTC P1447 is displayed with P0121, perform trouble diagnosis for DTC P0121 first. (SeeEC-186, "DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR" .)



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

EBS001C4

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

Possible Cause

EBS001C5

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Accelerator pedal position sensor
- Blocked purge port
- EVAP canister vent control valve

DTC Confirmation Procedure

EBS001C6

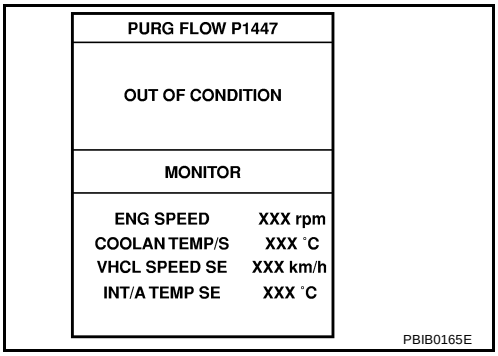
CAUTION:
Always drive vehicle at a safe speed.

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 test at a temperature of 5°C (41°F) or more.

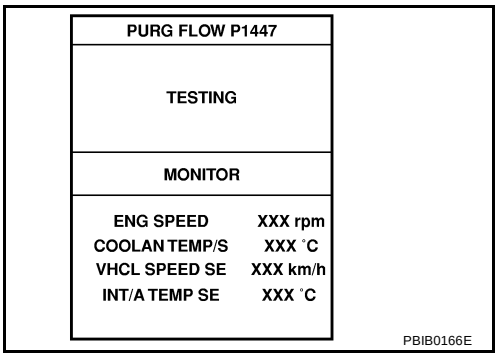
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P1447” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.

5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.



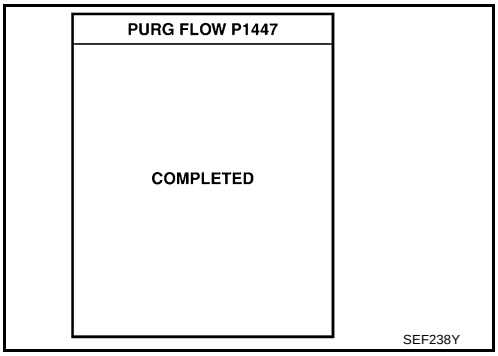
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)



Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If “TESTING” is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-518 .



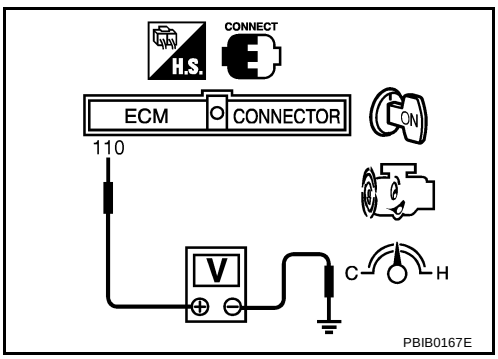
Overall Function Check

EBS001C7

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine (TCS switch “OFF”) and warm it up to normal operating temperature.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 110 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON

Engine speed	Approx. 3,000 rpm
Gear position	Any position other than “P”, “N” or “R”

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to “Diagnostic Procedure”, EC-518 .

Diagnostic Procedure

EBS001C8

1. CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

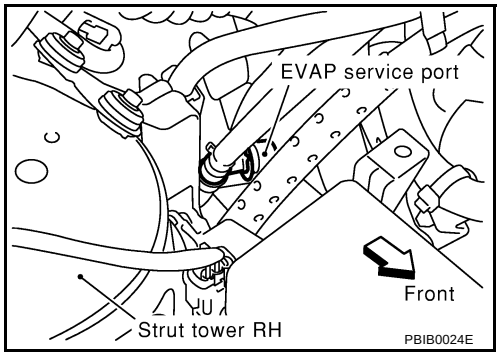
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

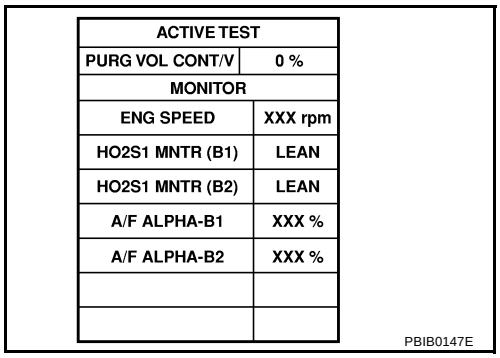
With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.



5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100.0%	Should exist.
0.0%	Should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

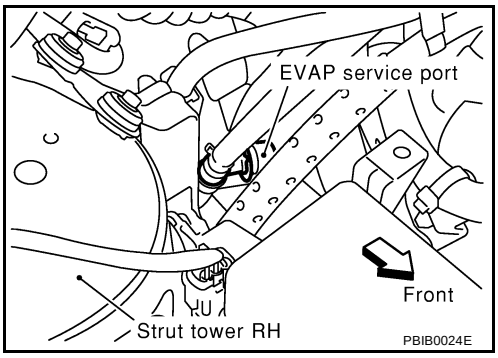
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.

   Vacuum should exist.

6. Release the accelerator pedal fully and let idle.

   Vacuum should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

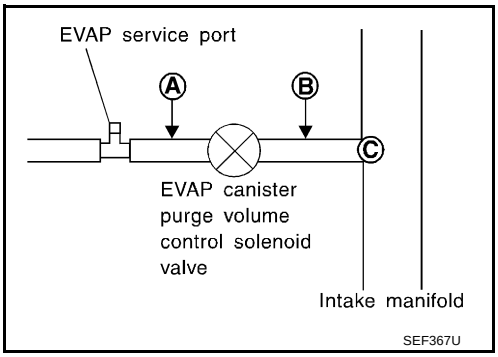
1. Turn ignition switch “OFF”.
2. Check EVAP purge line for improper connection or disconnection. Refer to “EVAPORATIVE EMISSION LINE DRAWING”, EC-607 .

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

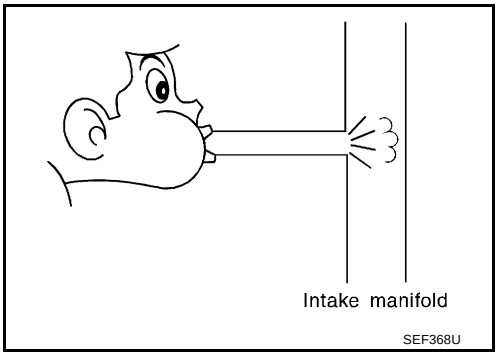
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

OK >> GO TO 6.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB0147E

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to “Component Inspection”, EC-365 .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 9.
NG >> Repair it.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to “DTC Confirmation Procedure” for DTC P0450, EC-376 .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 12.
NG >> Clean the rubber tube using an air blower.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to “Component Inspection”, EC-371 .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to “EVAPORATIVE EMISSION LINE DRAWING”, EC-607 .

OK or NG

OK >> GO TO 14.
NG >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

DTC P1448 EVAP CANISTER VENT CONTROL VALVE (OPEN)

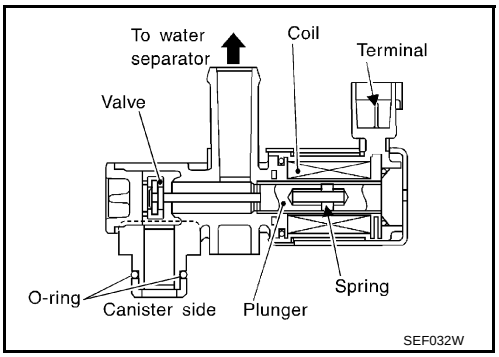
PFP:14935

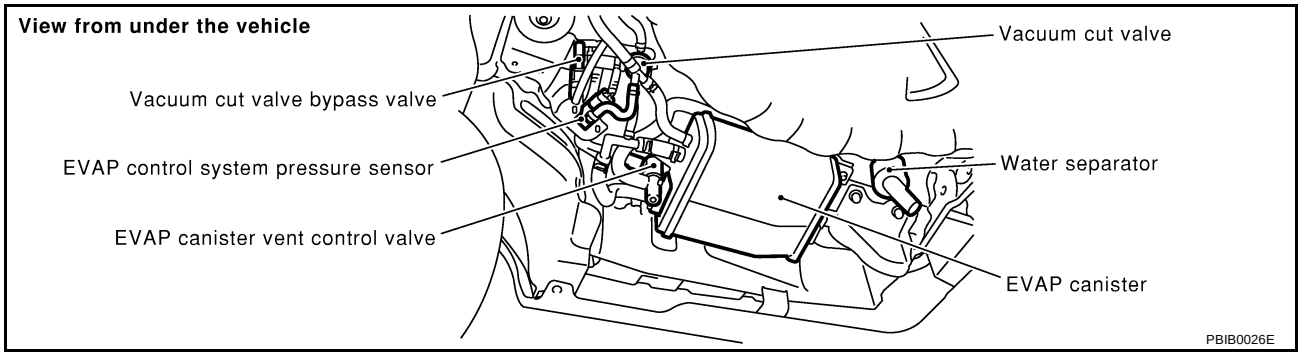
Component Description

EBS001C9

NOTE:
If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

EBS001CA

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

EBS001CB

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

EBS001CC

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

DTC Confirmation Procedure

EBS001CD

NOTE:

- **If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

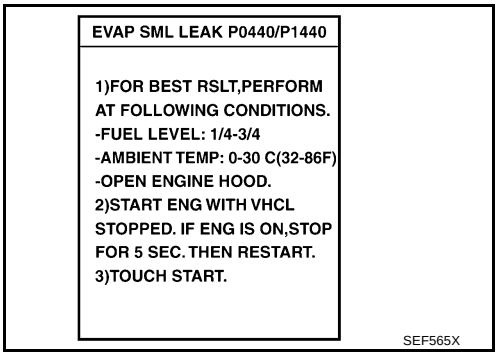
WITH CONSULT-II

TESTING CONDITION:

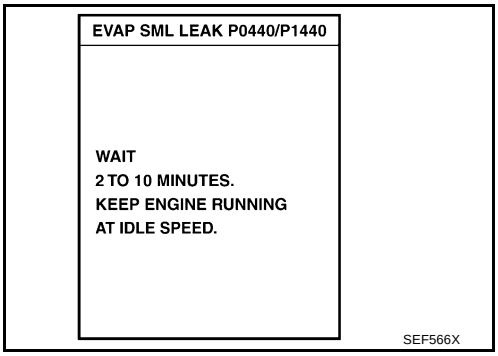
- **Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

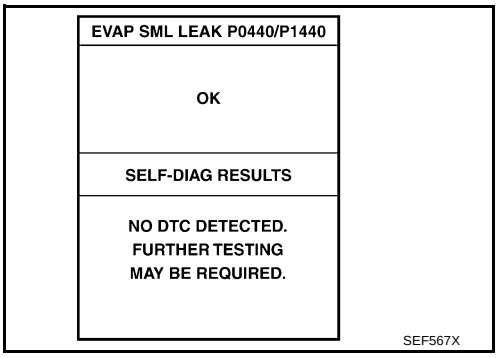


5. Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
   If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-82 .

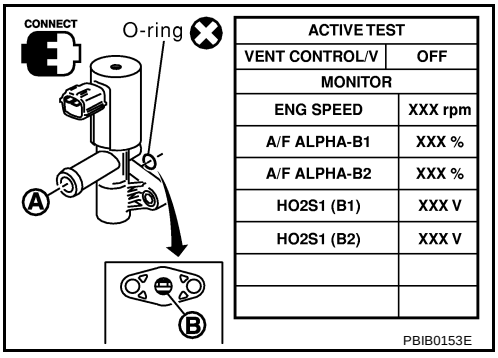


6. Make sure that “OK” is displayed.
   If “NG” is displayed, go to the following step.

   NOTE:
   Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
7. Stop engine and wait at least 10 seconds, then turn “ON”.
8. Disconnect hose from water separator.
9. Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
10. Touch “ON” and “OFF” alternately.
11. Make sure the following.



Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes



If the result is NG, go to “Diagnostic Procedure”, EC-526 .
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-352 .

Overall Function Check

EBS001CE

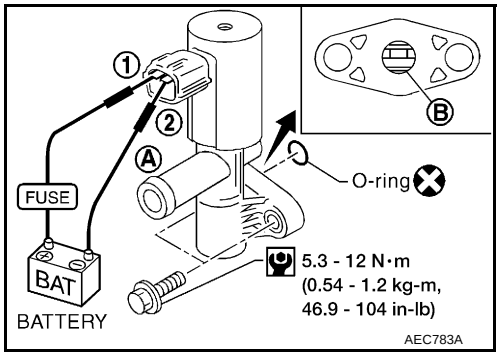
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

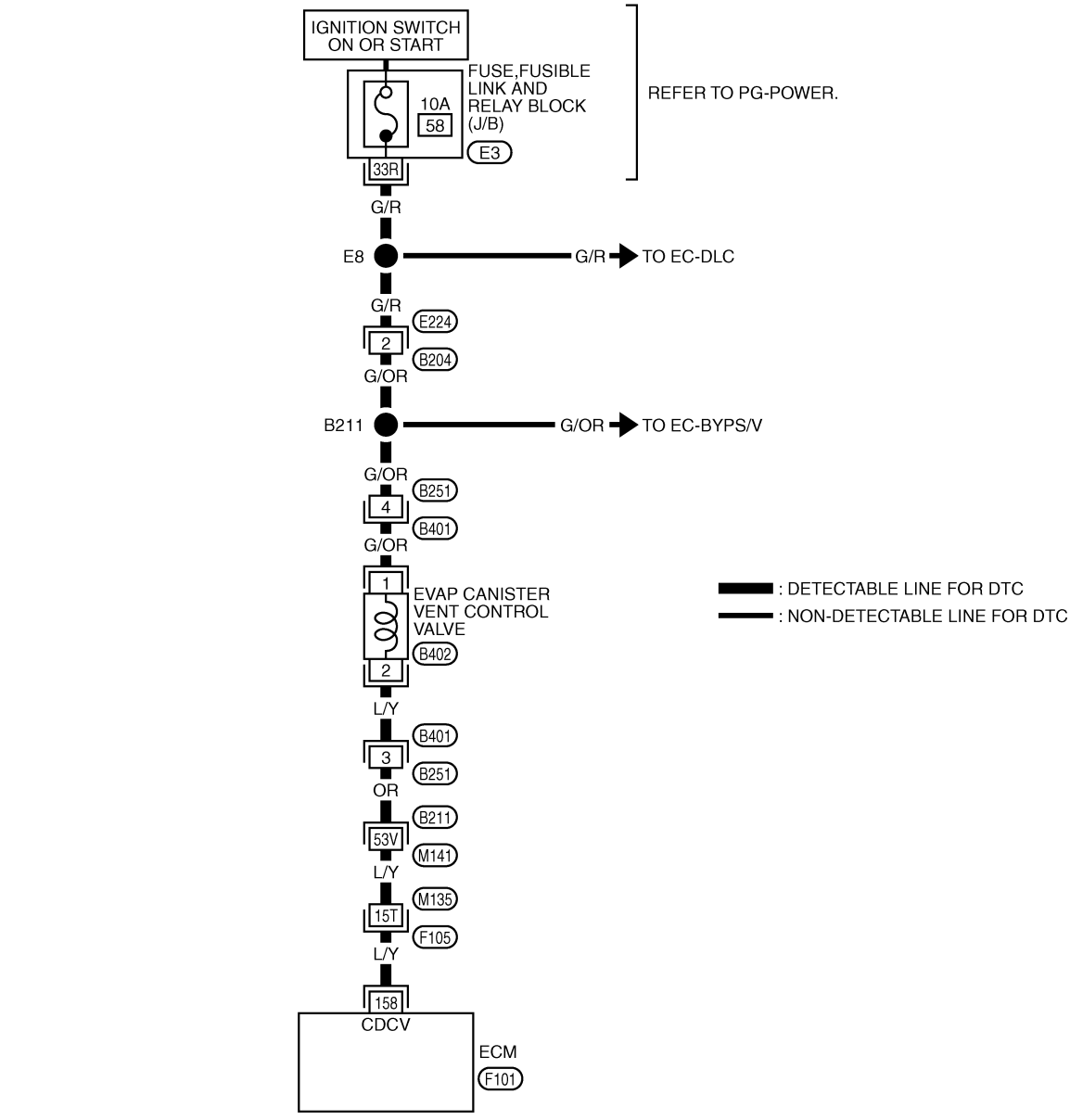
If the result is NG, go to “Diagnostic Procedure”, EC-526 .
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-352 .

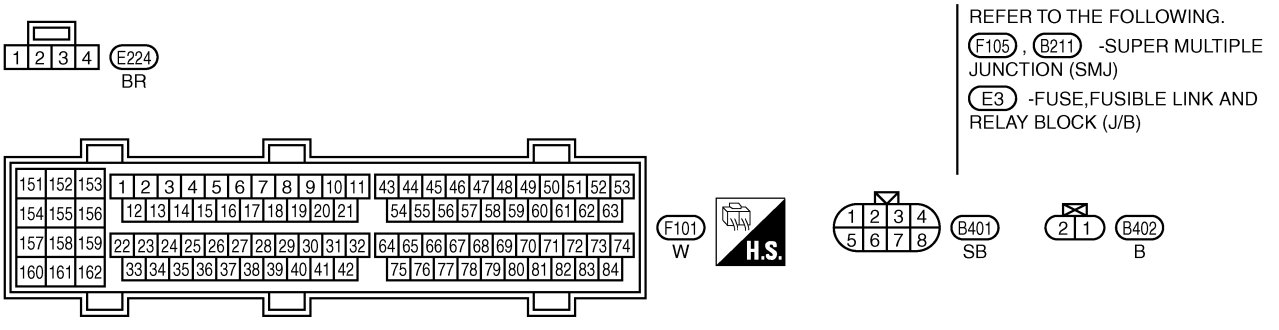


Wiring Diagram

EBS001CF

EC-VENT/V-01





TBWM0025E

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

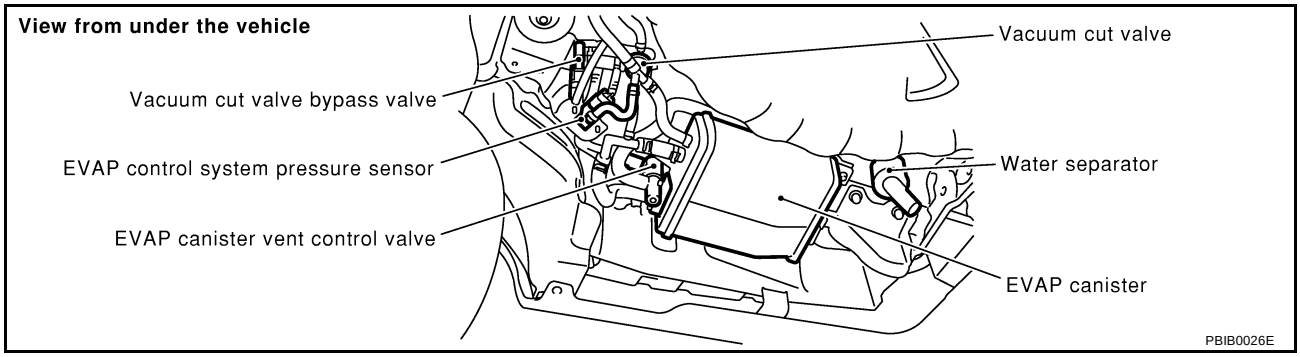
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
158	L/Y	EVAP canister vent control valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS001CG

1. CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.



3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to “Component Inspection”, EC-528 .

OK or NG

OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3. CHECK VACUUM CUT VALVE

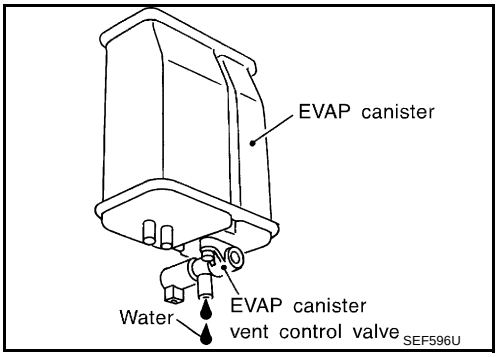
Refer to “Component Inspection”, EC-553 .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum cut valve.

4. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 5.
No >> GO TO 7.

5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair it.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to “Component Inspection”, EC-380 .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

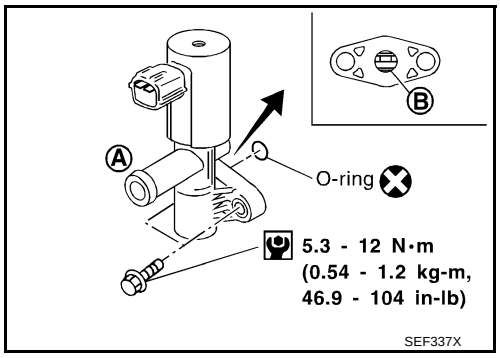
Component Inspection

EBS001CH

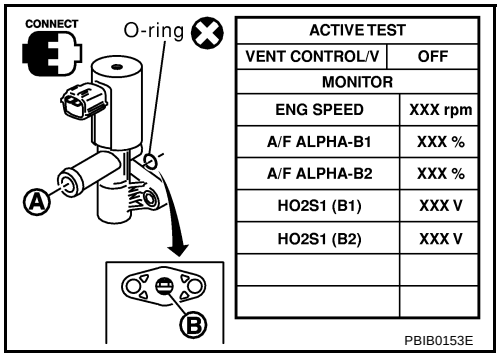
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch “ON”.
5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

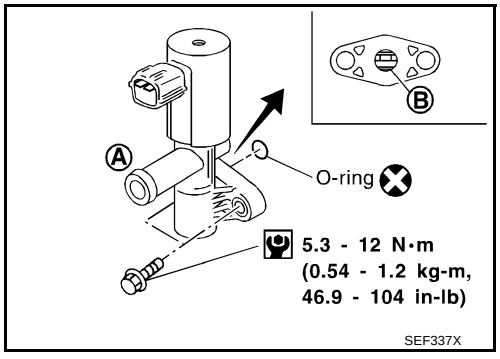


6. Check air passage continuity and operation delay time.
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform Test No. 9 again.

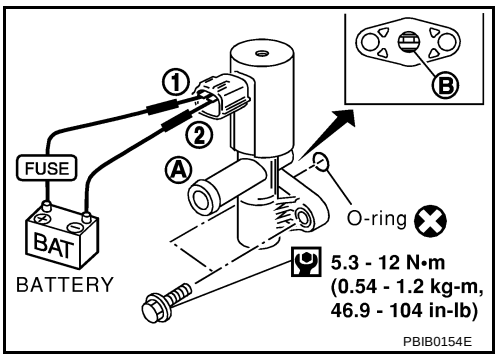


With GST

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform Test No. 9 again.



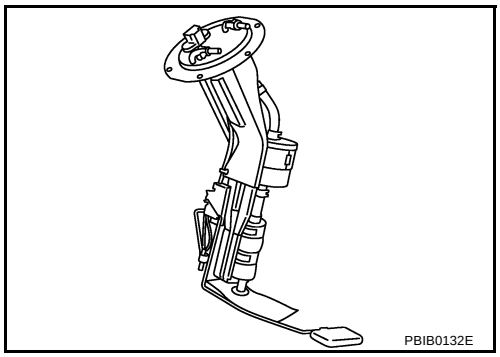
DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

PFP:25060

Component Description

EBS001CJ

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


PBIB0132E

On Board Diagnosis Logic

EBS001CK

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

EBS001CL

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

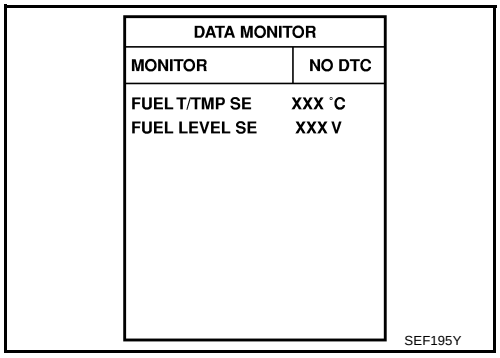
DTC Confirmation Procedure

EBS001CM

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 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-532
   .



SEF195Y

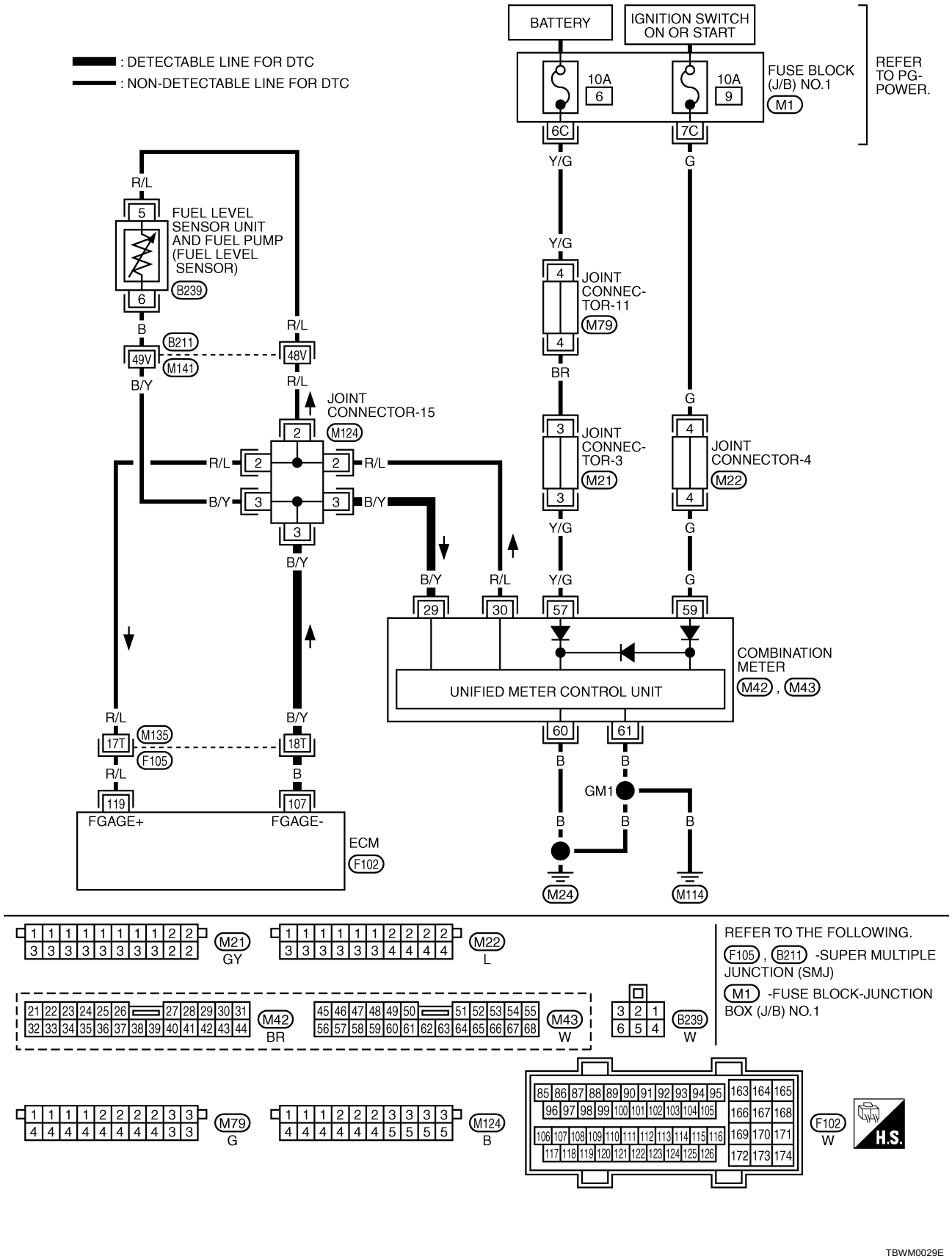
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS001CN

EC-FLS3-01



TBWM0029E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
107	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
119	R/L	Fuel level sensor	**[Ignition switch “ON”]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

Diagnostic Procedure

EBS001CO

1. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect combination meter harness connectors.
4. Check harness continuity between ECM terminal 107 and combination meter terminal 29.
   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 >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Joint connector-15
- Harness for open and short between ECM and combination meter

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

3. CHECK COMBINATION METER AND GROUND CIRCUIT

Refer to DI-5, "COMBINATION METERS" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FUEL LEVEL SENSOR

Refer to DI-22, "Inspection/Fuel Level Sensor Unit" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

5. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Removal and Installation

EBS001CP

FUEL LEVEL SENSOR

Refer to DI-22, "Inspection/Fuel Level Sensor Unit" .

DTC P1480 COOLING FAN SPEED CONTROL SOLENOID VALVE (CIRCUIT)

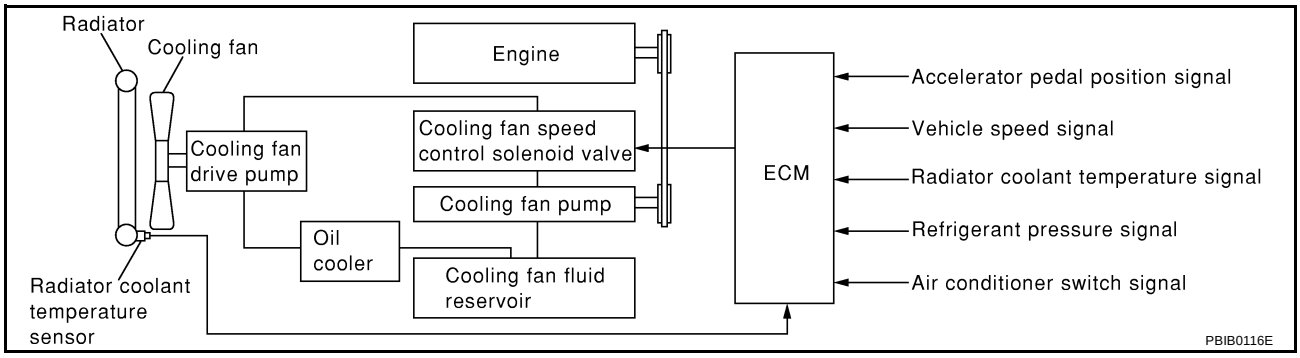
PFP:21140

Description

EBS002PM

SYSTEM DESCRIPTION

This system controls the cooling fan operating speed. The opening of the cooling fan speed control solenoid valve changes to control oil pressure provided to the cooling fan drive pump.
This system consists of the cooling fan pump, cooling fan drive pump, cooling fan speed control solenoid valve, oil cooler, cooling fan fluid reservoir, etc.
The cooling fan pump is operated by engine with the drive belts and provides oil pressure to the cooling fan drive pump which operates the cooling fan. The cooling fan speed control solenoid valve is installed between the cooling fan pump and cooling fan drive pump. The solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the solenoid valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.



COOLING FAN SPEED CONTROL

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Cooling fan speed control	Cooling fan speed control solenoid valve
Crankshaft position sensor (POS)	Engine speed		
Radiator coolant temperature sensor	Radiator coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Wheel sensors (CAN communication)	Vehicle speed		
A/C auto amp. (CAN communication)	Air conditioner switch signal		

The ECM controls the cooling fan speed corresponding to the engine speed, the radiator coolant temperature, refrigerant pressure, vehicle speed, air conditioner switch signal, etc.
The ECM determines the target fan speed based on the basic fan speed considering the radiator coolant temperature and the engine speed. The ECM controls fan speed between 0 to 2,550 rpm.
When the cooling fan speed control solenoid valve is malfunctioning (does not operate), the cooling fan is operated at the maximum speed by engine through the drive belts.

COOLING FAN BASIC SPEED

unit: rpm

Air conditioner	Refrigerant pressure	Vehicle speed		
		Less than 20 km/h (12 MPH)	20 - 80 km/h (12 - 50 MPH)	More than 80 km/h (50 MPH)
OFF	-	300	300	300
ON	Less than 680 kPa (6.94 kg/cm^2 , 98.6 psi)	700	400	300
	680 - 1,660 kPa (6.94 - 16.93 kg/cm^2 , 98.6 - 240.7 psi)	900	700	300
	1,660 - 1,960 kPa (16.93 - 19.99 kg/cm^2 , 240.7 - 284.2 psi)	1100	1100	1250
	More than 1,960 kPa (19.99 kg/cm^2 , 284.2 psi)	1250	1200	1250

COMPONENT DESCRIPTION

Cooling Fan Speed Control Solenoid Valve

The cooling fan speed control solenoid valve uses a ON/OFF duty to control the pressure of the cooling fan fluid from the cooling fan pump. This solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse is sent to the solenoid valve, the lower speed the cooling fan operates.

CONSULT-II Reference Value in Data Monitor Mode

EBS002PN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
TRGT FAN RPM	● Ignition switch: ON (Engine stopped)	0 rpm
	● Engine: Idle	300 - 2,550 rpm
FAN AMP	● Cooling fan is operating.	Approx. 0 - 800 mA

On Board Diagnosis Logic

EBS002PO

Malfunction is detected when
(Malfunction A) an excessively low ampere of current flows through the cooling fan speed control solenoid valve to ECM, even though the radiator coolant temperature is low,
(Malfunction B) an excessively high ampere of current flows through the cooling fan speed control solenoid valve to ECM, even though the radiator coolant temperature is high.

Possible Cause

EBS002PP

- Harness or connectors
  (Cooling fan speed control solenoid valve circuit is open or shorted.)
- Cooling fan speed control solenoid valve

DTC Confirmation Procedure

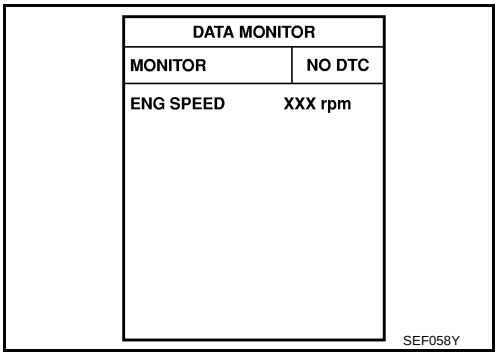
EBS002PQ

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. Confirm “RADIATOR TEMP” indicates less than 80 °C (176 °F).
   If not, cool down the engine.
4. Start engine and let it idle for at least 5 seconds.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-538
   .



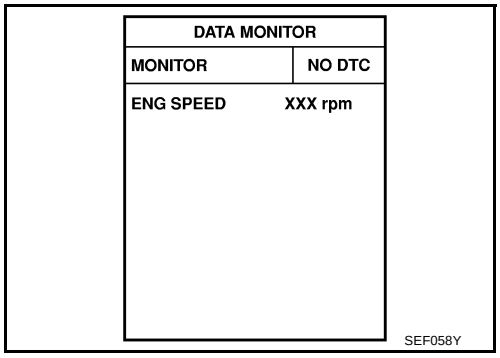
With GST

1. Turn ignition switch “ON”.
2. Set voltmeter probes between ECM terminal 122 (radiator coolant temperature sensor signal) and engine ground.
3. Check the voltage should be above 1.23V.
   If not, cool down the engine.
4. Start engine and let it idle for at least 5 seconds.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-538 .

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Disconnect radiator coolant temperature sensor harness connector.
3. Connect 2.2 kΩ resistor to the radiator coolant temperature sensor harness connector.
4. Turn ignition switch “ON”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine and let it idle for at least 5 seconds.
7. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-538
   .



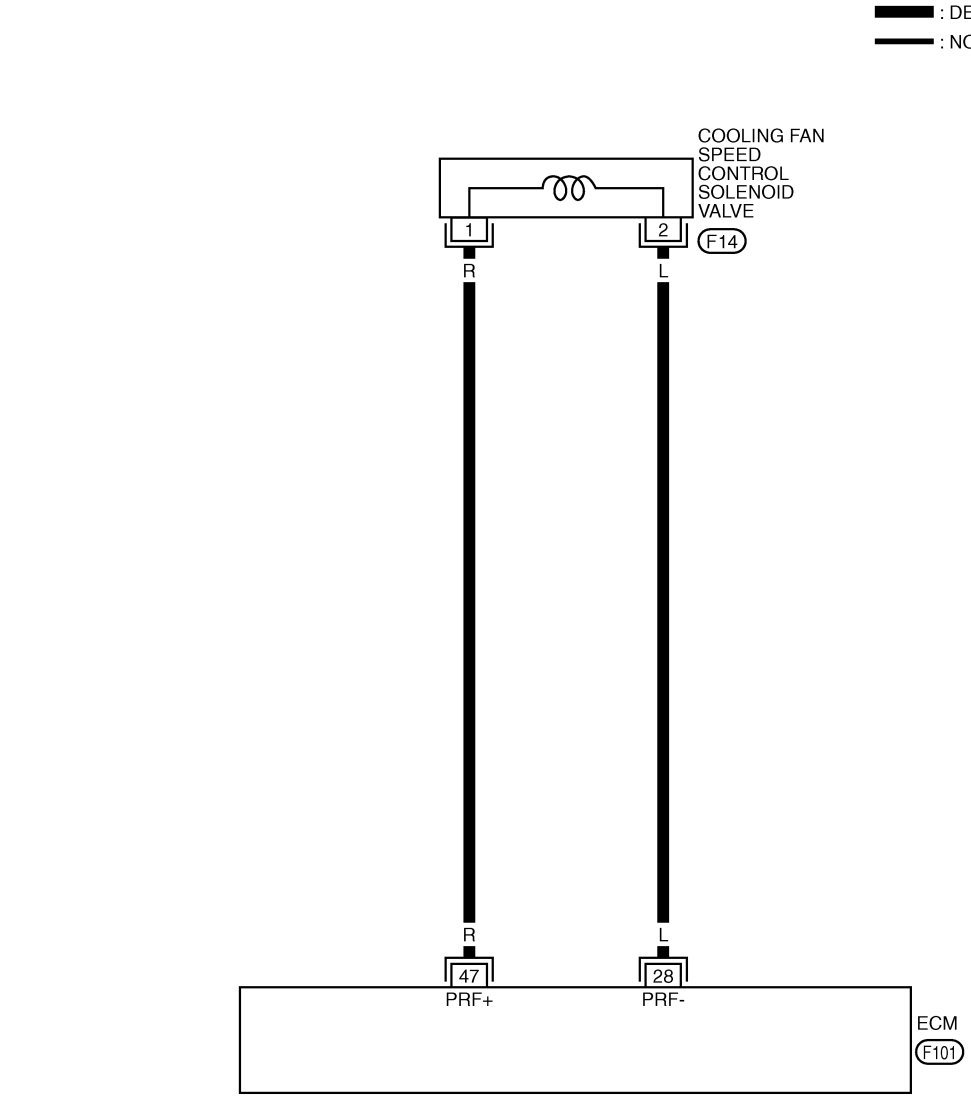
With GST

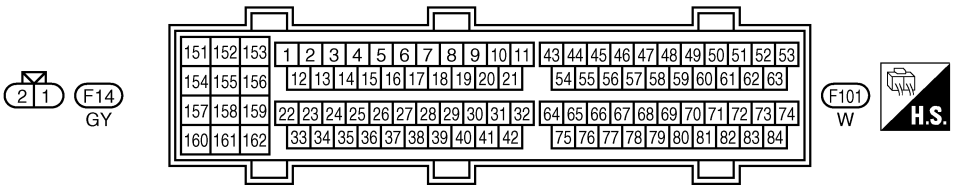
Follow the procedure “With CONSULT-II”.

Wiring Diagram

EBS002PR

EC-COOL/V-01

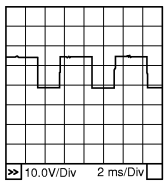




TBWM0048E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	L	Cooling fan speed control solenoid valve ground	**[Engine is running]**	Approximately 0V
47	R	Cooling fan speed control solenoid valve	**[Engine is running]** ● Idle speed	6.5 - 8V★  PBIB0049E

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

Diagnostic Procedure

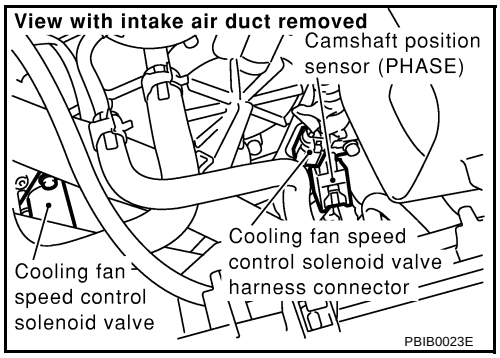
EBS002PS

1. CHECK COOLING FAN SPEED CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan speed control solenoid valve harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 47 and cooling fan speed control solenoid valve terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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



PBIB0023E

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 COOLING FAN SPEED CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 28 and cooling fan speed control solenoid valve 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 3.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

3. CHECK COOLING FAN SPEED CONTROL SOLENOID VALVE

Refer to “Component Inspection”, EC-539 .

OK or NG

OK >> GO TO 4.
NG >> Replace cooling fan speed control solenoid valve.

4. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

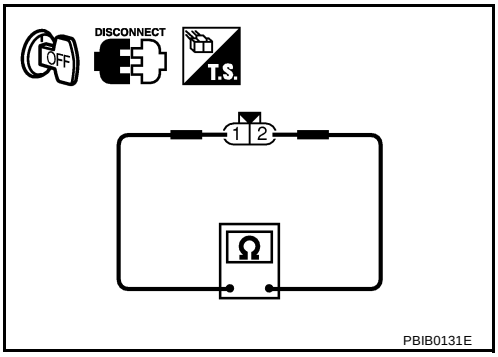
Component Inspection

EBS002PT

COOLING FAN SPEED CONTROL SOLENOID VALVE

Check resistance between cooling fan speed control solenoid valve terminals 1 and 2.

Resistance: Approximately 8Ω [at 20°C (68°F)]



Removal and Installation

EBS002PU

COOLING FAN SPEED CONTROL SOLENOID VALVE

Cooling fan speed control solenoid valve is built-into the cooling fan pump which is assembled to water pump. Refer to CO-21, "WATER PUMP" .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

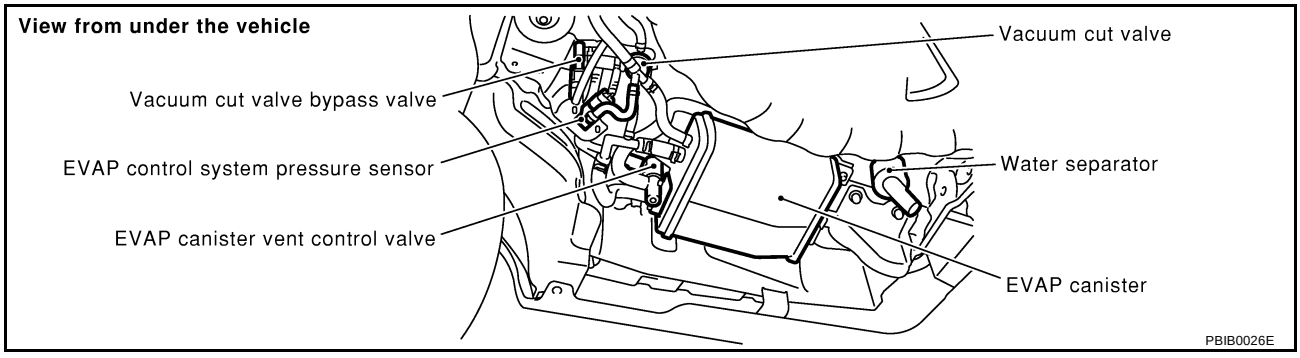
PFP:17372

Description

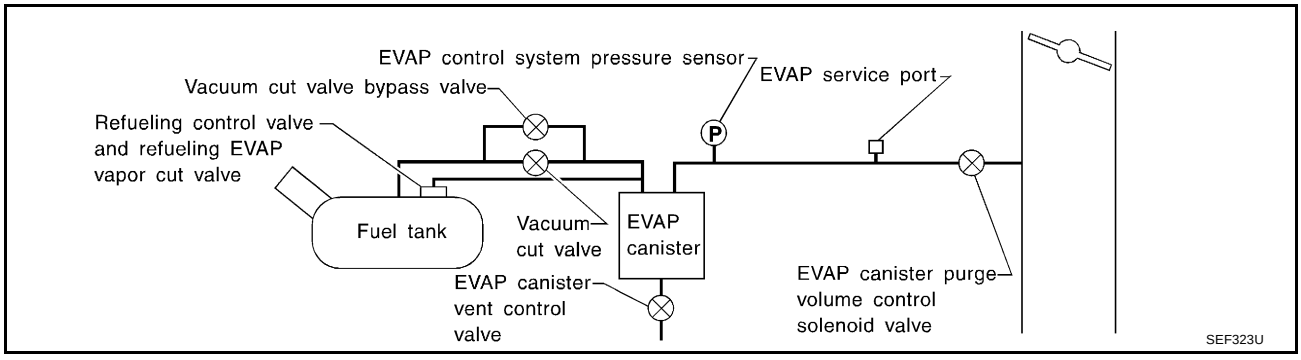
EBS001CQ

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

EBS001CR

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPAS S/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

EBS001CS

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

EBS001CT

- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

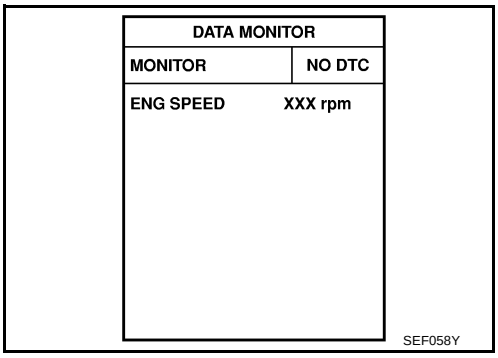
EBS001CU

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 speed.

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 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-543
   .



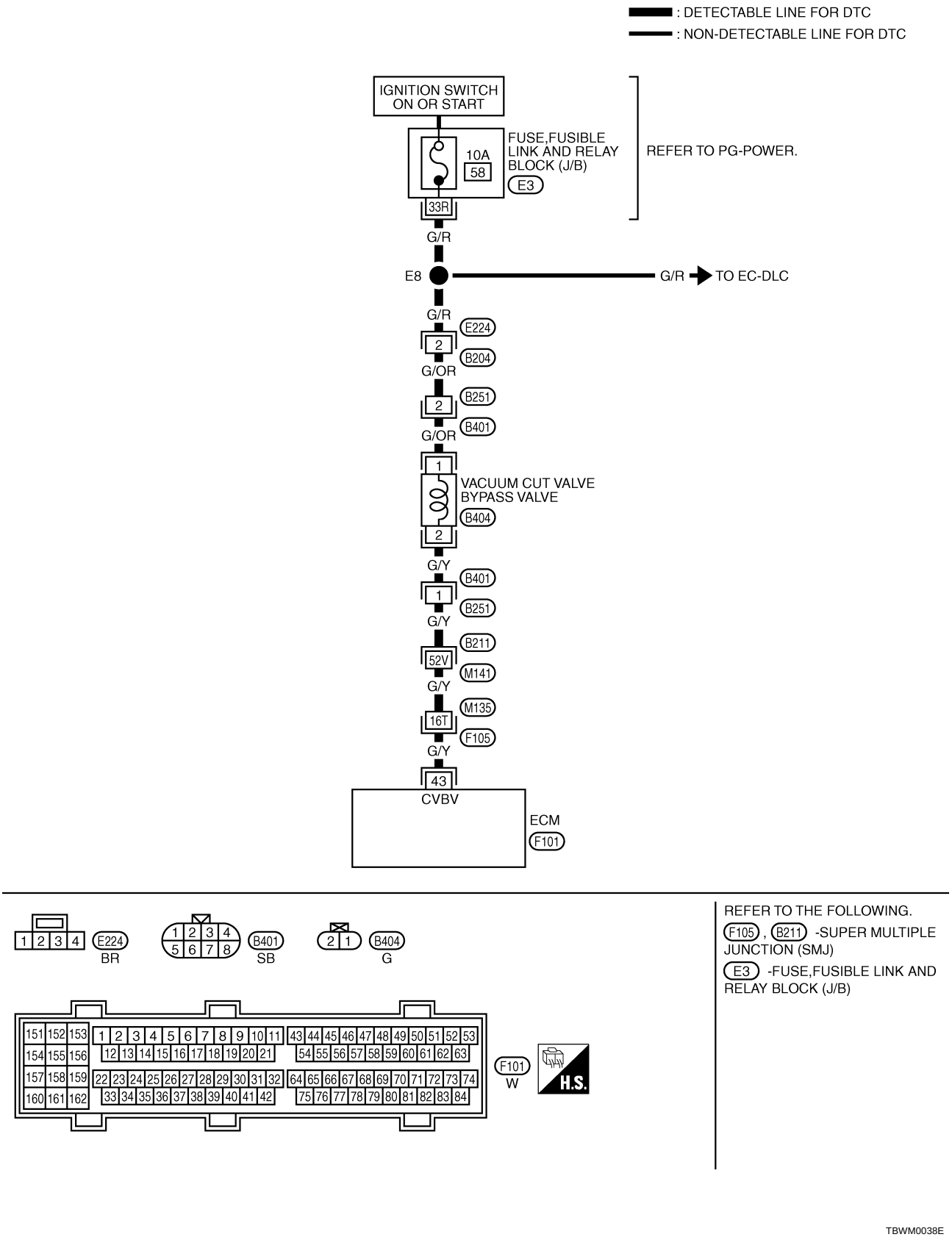
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS001CV

EC-BYPS/V-01



TBWM0038E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	G/Y	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS001CW

1. INSPECTION START

Do you have CONSULT-II?

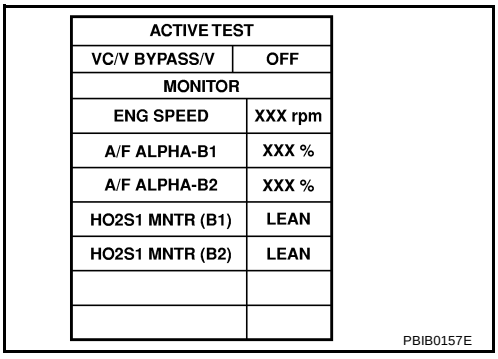
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF" and then "ON".
2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

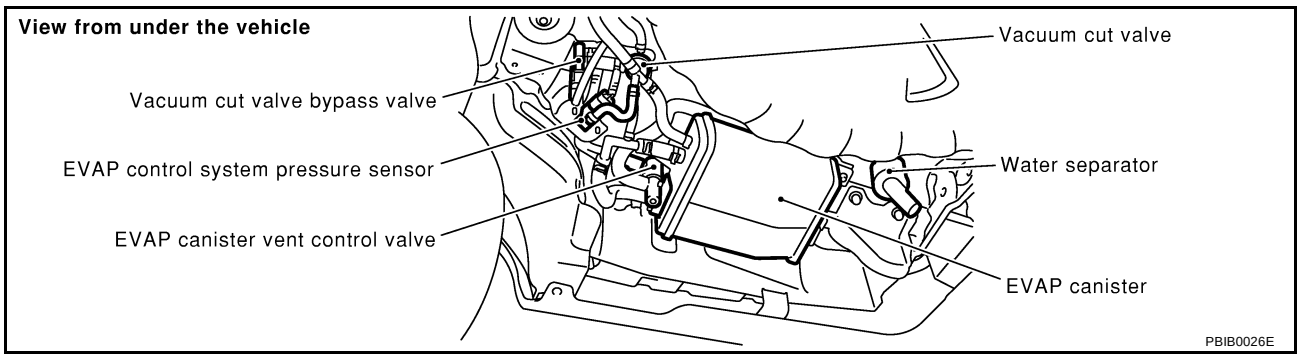


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

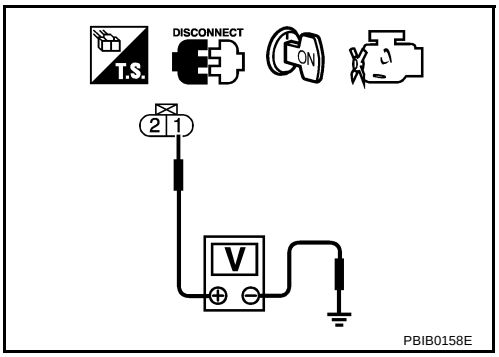
3. CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect vacuum cut valve bypass valve harness connector.



3. Turn ignition switch “ON”.
4. Check voltage between vacuum cut valve bypass valve 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 B401, B251
- Harness connectors B204, E224
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

>> Repair harness or connectors.

5. CHECK VACUUM CUT VALVE BYPASS 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 43 and vacuum cut valve bypass 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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B401, B251
- Harness connectors B211, M141
- Harness connectors M135, F105
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to “Component Inspection”, EC-545 .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Component Inspection

EBS001CX

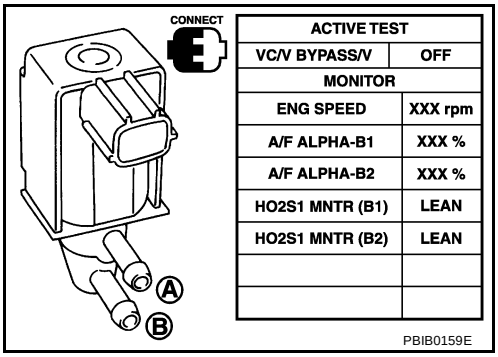
VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BUPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

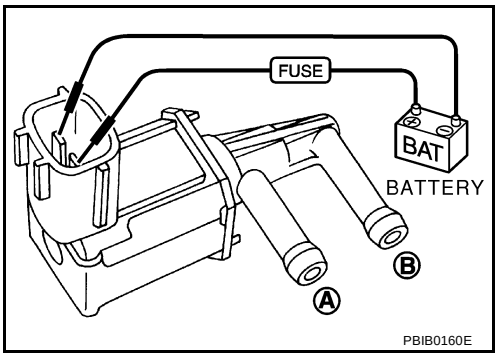


With GST

Check air passage continuity and operation delay time 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

Operation takes less than 1 second.



DTC P1491 VACUUM CUT VALVE BYPASS VALVE

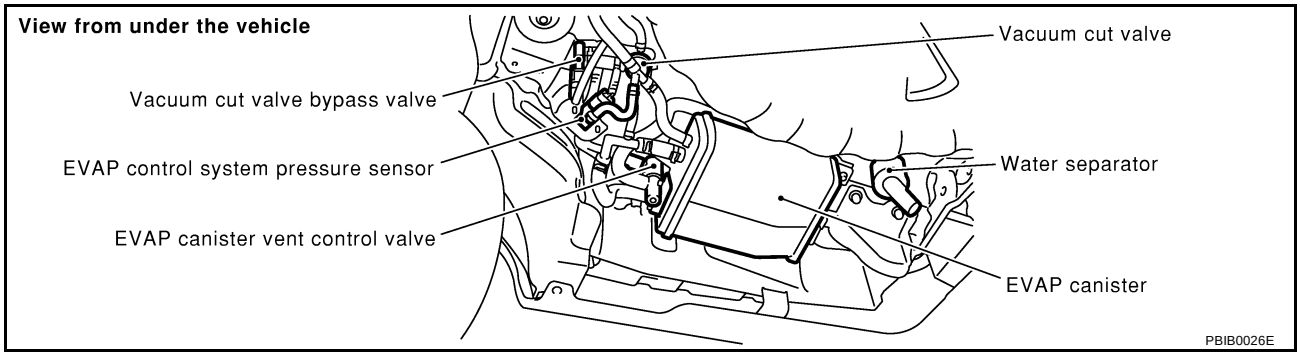
PFP:17372

Description

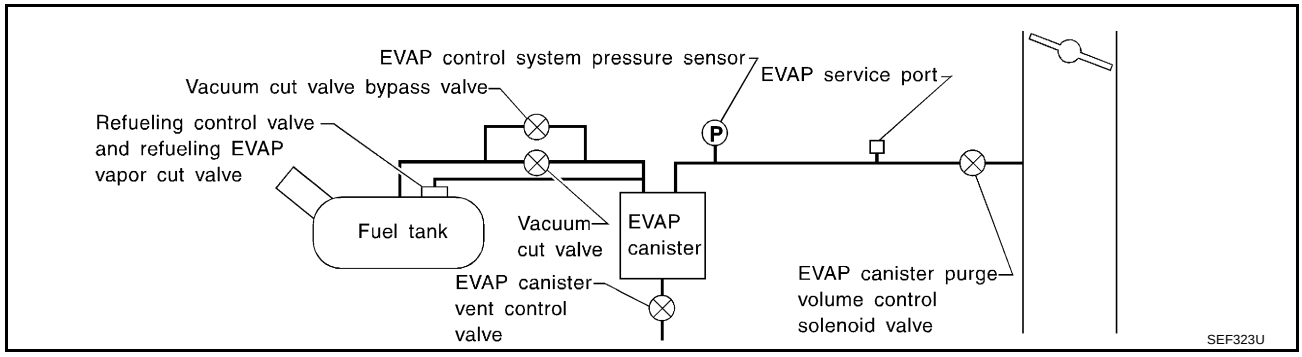
EBS001CZ

COMPONENT DESCRIPTION

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.
The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.
The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.



EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

EBS001D0

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPAS S/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

EBS001D1

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

EBS001D2

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

EBS001D3

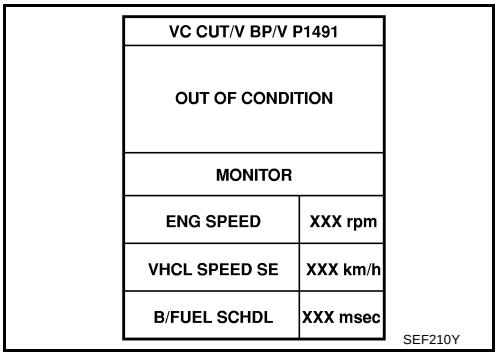
CAUTION:
Always drive vehicle at a safe speed.

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 test at a temperature of 5 to 30°C (41 to 86°F).

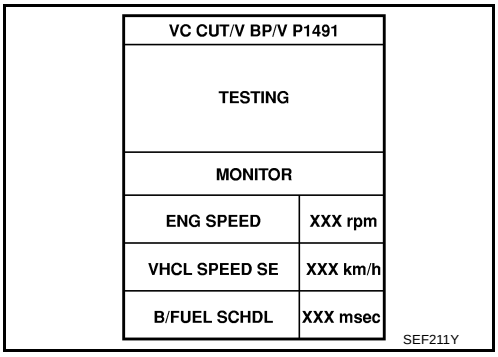
WITH CONSULT-II

1. Turn ignition switch “ON”.
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 and let it idle for at least 70 seconds.
5. Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.



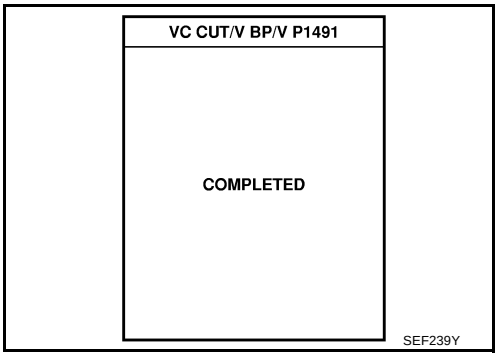
7. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)

ENG SPEED	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 10.0 msec



If “TESTING” is not displayed after 5 minutes, retry from step 3.

8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-550 .



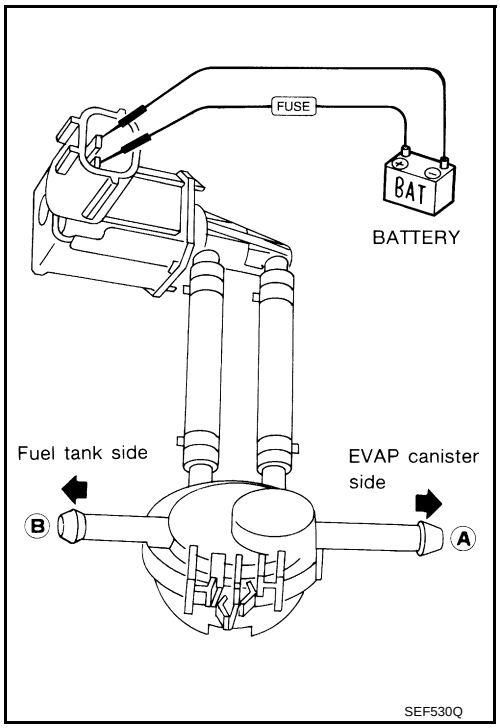
Overall Function Check

EBS001D4

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

WITH GST

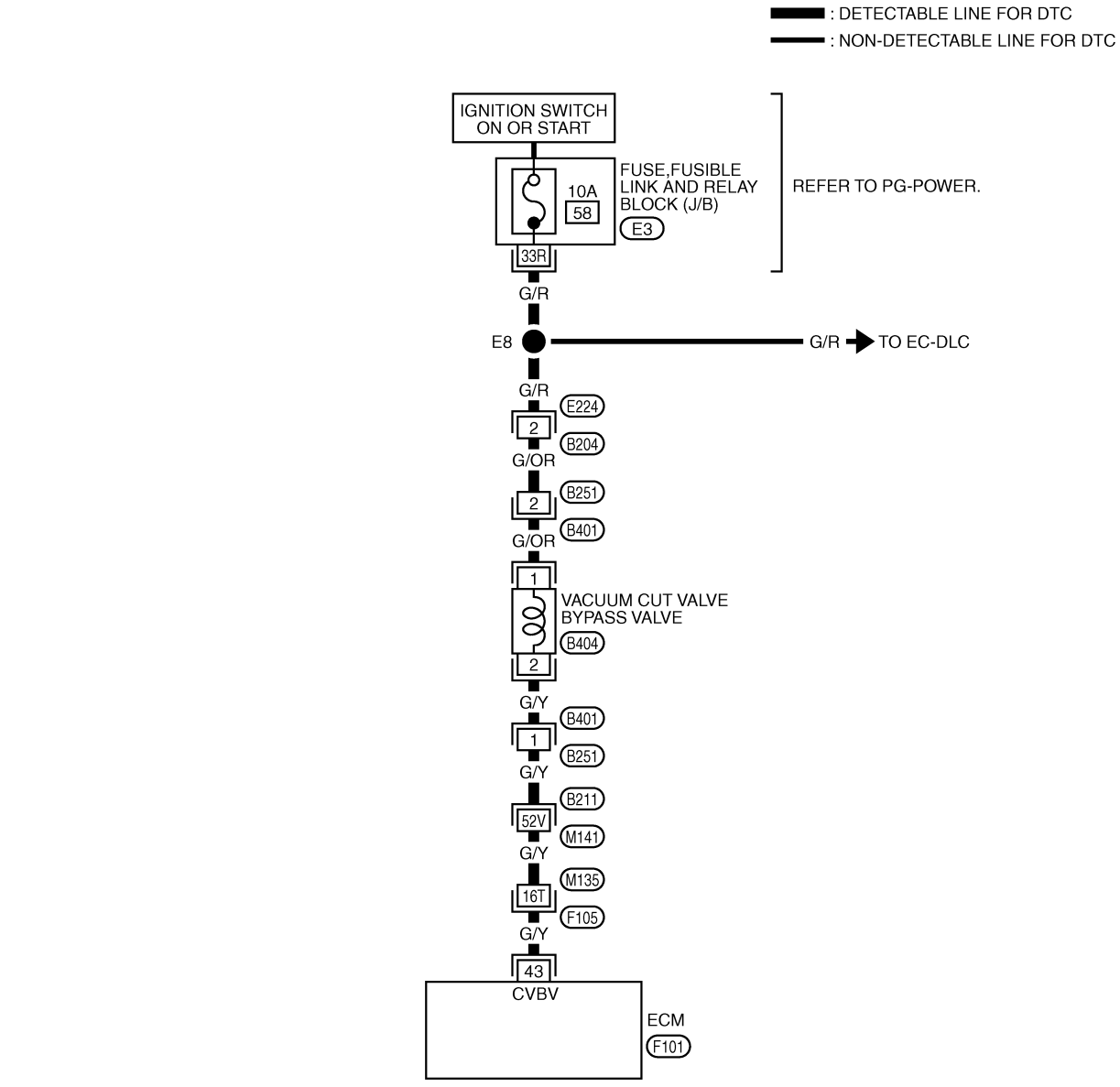
1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B** .
7. Blow air in port **B** and check that air flows freely out of port **A** .
8. If NG, go to “Diagnostic Procedure”, EC-550 .

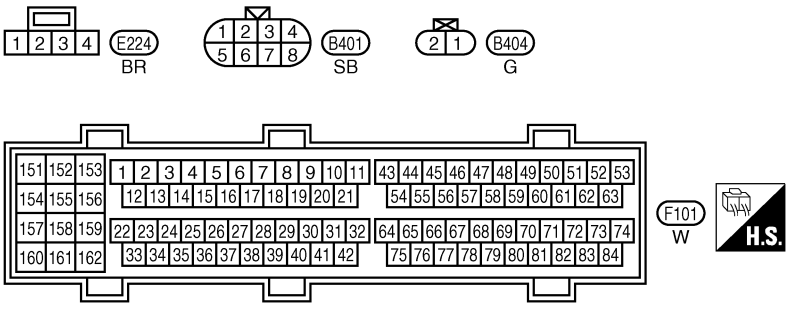


Wiring Diagram

EBS001D5

EC-BYPS/V-01





REFER TO THE FOLLOWING.
F105 , B211 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0038E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	G/Y	Vacuum cut valve bypass valve	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS001D6

1. INSPECTION START

Do you have CONSULT-II?

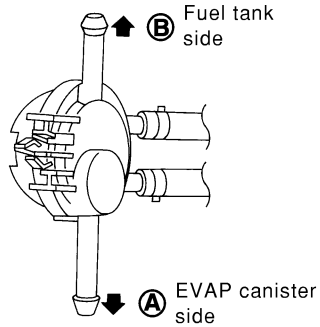
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN

PBIB0161E

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

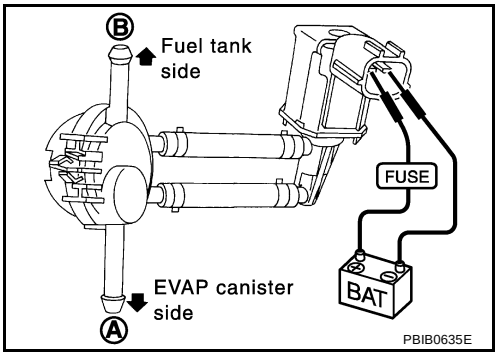
3. CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.

OK or NG

OK >> GO TO 4.
NG >> GO TO 7.



4. CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE PORT

Check EVAP purge port of fuel tank for clogging.

OK or NG

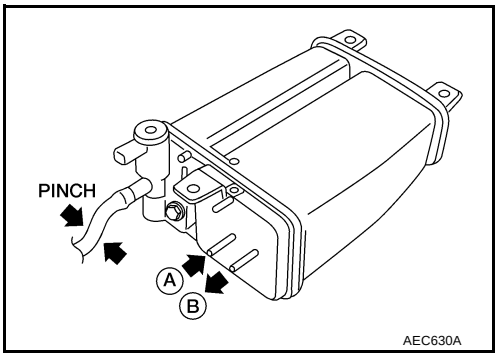
OK >> GO TO 6.
NG >> Clean EVAP purge port.

6. CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister.



7. CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace hoses.

8. CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to “Component Inspection”, EC-553 .

OK or NG

OK >> GO TO 9.
NG >> Replace vacuum cut valve bypass valve.

9. CHECK VACUUM CUT VALVE

Refer to “Component Inspection”, EC-553 .

OK or NG

OK >> GO TO 10.
NG >> Replace vacuum cut valve.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch “OFF”.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to “Component Inspection”, EC-380 .

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP control system pressure sensor.

13. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 14.
NG >> Clean the rubber tube using an air blower.

14. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to “Component Inspection”, EC-371 .

OK or NG

OK >> GO TO 15.
NG >> Replace EVAP canister vent control valve.

15. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Component Inspection

EBS001D7

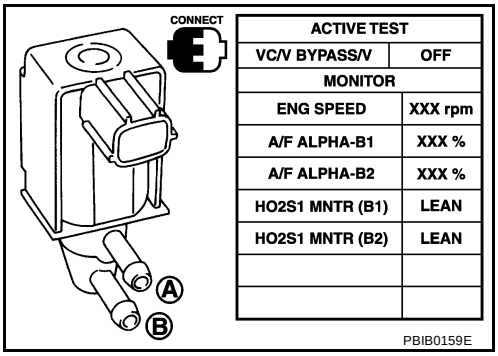
VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BUPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

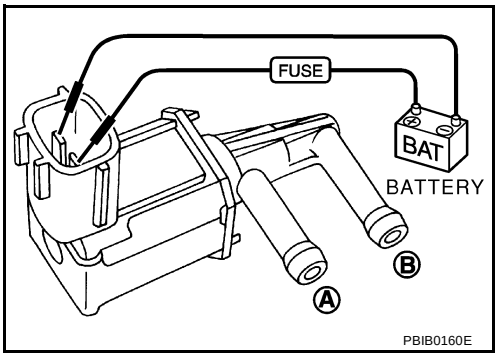


With GST

Check air passage continuity and operation delay time 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

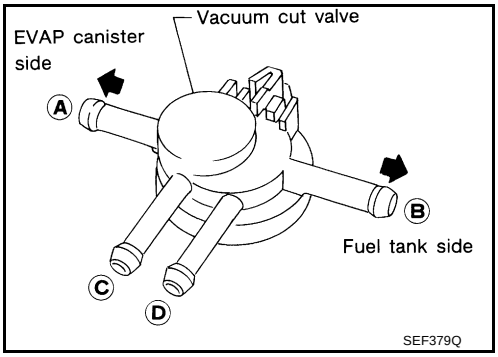
Operation takes less than 1 second.



VACUUM CUT VALVE

Check vacuum cut valve as follows:

- Plug port **C** and **D** with fingers.
- Apply vacuum to port **A** and check that there is no suction from port **B** .
- Apply vacuum to port **B** and check that there is suction from port **A** .
- Blow air in port **B** and check that there is a resistance to flow out of port **A** .
- Open port **C** and **D** .
- Blow air in port **A** check that air flows freely out of port **C** .
- Blow air in port **B** check that air flows freely out of port **D** .



DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

Description

EBS001D9

NOTE:
If DTC is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-151, "DTC U1000 CAN COMMUNICATION LINE" .
The malfunction information related to A/T (Automatic Transmission) is transferred through the CAN communication line from TCM (Transmission control module) to ECM. Therefore, be sure to erase the DTC malfunction information not only in TCM (Transmission control module) but also ECM after an A/T related repair.

On Board Diagnosis Logic

EBS001DA

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

Possible Cause

EBS001DB

- Dead (Weak) battery
- TCM (Transmission control module)

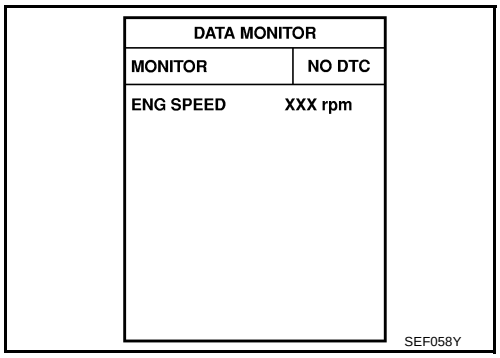
DTC Confirmation Procedure

EBS001DC

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 at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 40 seconds.
4. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-554 .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS001DE

1. CHECK TCM FUNCTION

Refer to AT-36, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" .

>> **INSPECTION END**

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

PFP:32006

Component Description

EBS001DF

When the gear position is “P” or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

EBS001DG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

On Board Diagnosis Logic

EBS001DH

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

Possible Cause

EBS001DI

- Harness or connectors
  [The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

EBS001DJ

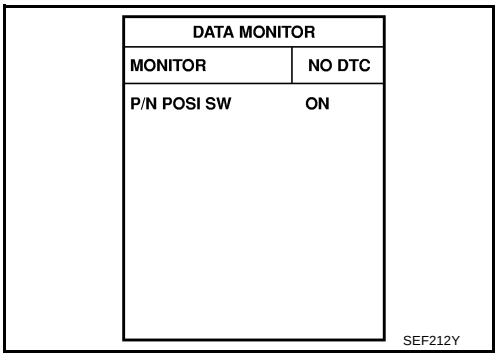
CAUTION:
Always drive vehicle at a safe speed.

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

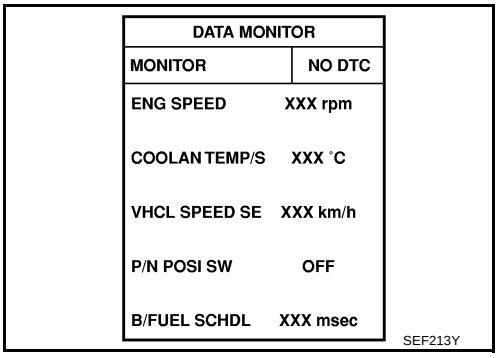
1. Turn ignition switch “ON”.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

Position (Selector lever)	Known-good signal
“N” and “P” position	ON
Except the above position	OFF



   If NG, go to “Diagnostic Procedure”,EC-558 .
   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	More than 1,200 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2 - 31 msec
VHCL SPEED SE	More than 65 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to “Diagnostic Procedure”,EC-558 .

Overall Function Check

EBS001DK

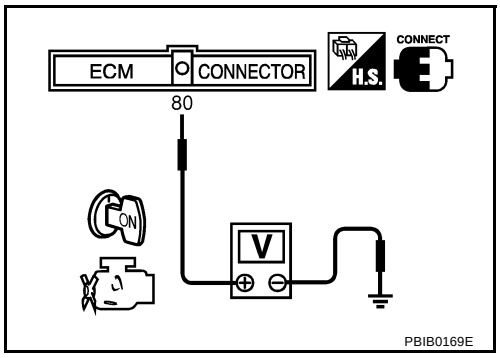
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 80 and body ground under the following conditions.

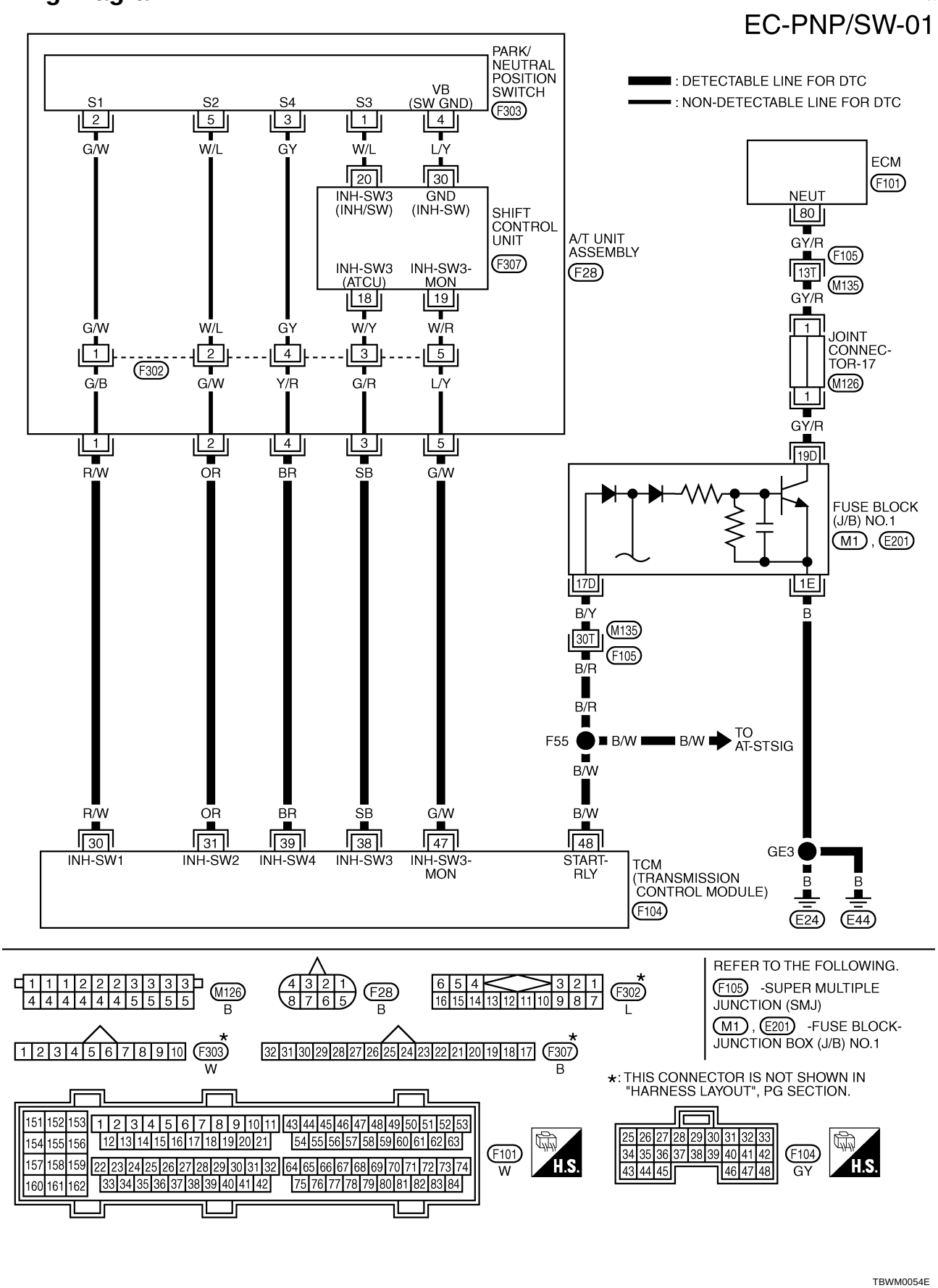
Condition (Gear position)	Voltage V (Known good data)
“P” and “N” position	Approx. 0
Except the above position	Approximately 5V

3. If NG, go to “Diagnostic Procedure”,EC-558 .



Wiring Diagram

EBS001DL



TBWM0054E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
80	GY/R	PNP switch	**[Ignition switch "ON"]** ● Gear position is "P" or "N".	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V

Diagnostic Procedure

EBS001DM

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

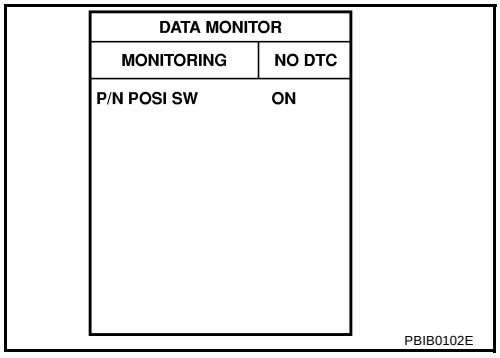
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK PNP SWITCH SIGNAL

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "A/T", then "DATA MONITOR" mode with CONSULT-II.
3. Select "P/N POSI SW" signal and check its indication under the following conditions.

Condition (Gear position)	P/N POSI SW
"P" or "N" position	ON
Other positions	OFF



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

3. CHECK PNP SWITCH SIGNAL

Without CONSULT-II

Confirm that the PNP switch signal is sent to TCM correctly.
Refer to AT-85, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK PNP SWITCH CIRCUIT

Check the PNP switch circuit.
Refer to AT-85, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

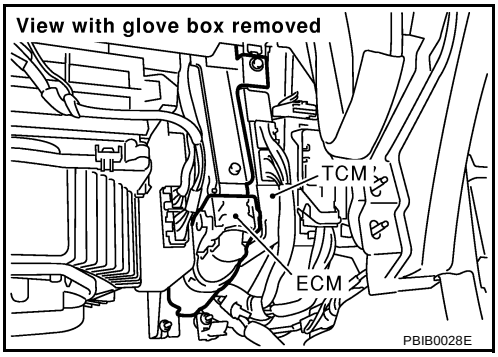
>> **INSPECTION END**

5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect TCM harness connector.
3. Disconnect fuse block (J/B) No. 1 harness connector.
4. Check harness continuity between TCM terminal 48 and fuse block (J/B) No.1 terminal 17D.
   Refer to Wiring Diagram.

   Continuity should exist.

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



OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Harness for open or short between TCM and fuse block (J/B) No. 1

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

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between fuse block (J/B) No. 1 terminal 1E and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. 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 connectors.

8. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and fuse block (J/B) No. 1 terminal 19D.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F105, M135
- Joint connector-17
- Harness for open or short between ECM and fuse block (J/B) No. 1

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

10. CHECK FUSE BLOCK (J/B) NO. 1

Refer to PG-75, "FUSE BLOCK - JUNCTION BOX (J/B) NO.1" .

OK or NG

OK >> GO TO 11.
NG >> Replace fuse block (J/B) No. 1.

11. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSI FOR INTERMITTENT INCIDENT”, EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1720 VEHICLE SPEED SENSOR (A/T OUTPUT)

PFP:31036

Description

EBS002WW

NOTE:
If DTC P1720 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to **EC-151, "DTC U1000 CAN COMMUNICATION LINE"** .
ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from VDC/TCS/ABS control unit, and the other is from TCM (Transmission control module). ECM uses these two signals for engine control.

CONSULT-II Reference Value in Data Monitor Mode

EBS002QI

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VEH SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value

On Board Diagnosis Logic

EBS002QJ

Malfunction is detected when ECM detects a difference between two vehicle speed sensor signals is out of the specified range.

Possible Cause

EBS002QK

- Harness or connectors
  (Revolution sensor circuit is open or shorted)
- Harness or connectors
  (Wheel sensor circuit is open or shorted.)
- TCM
- VDC/TCS/ABS control unit
- Combination meter

DTC Confirmation Procedure

EBS002QL

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”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Drive vehicle at a speed of 20 km/h (12 MPH) or more for at least 5 seconds without brake pedal depressing.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-561 .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS002QM

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-40, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH VDC/TCS/ABS CONTROL UNIT

Check DTC with VDC/TCS/ABS control unit. Refer to BRC-41, "Self-Diagnoses" .

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK COMBINATION METER

Check combination meter function. Refer to DI-5, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P1780 SHIFT CHANGE SIGNAL

PFP:31036

Description

EBS003MH

NOTE:
If DTC P1780 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-151, "DTC U1000 CAN COMMUNICATION LINE" .
ECM receives current gear position signal, next gear position signal, shift change signal, shift pattern signal through CAN communication line from TCM (Transmission control module). ECM uses these four signals for engine control.

On Board Diagnosis Logic

EBS003MI

Malfunction is detected when
(Malfunction A) The next gear position signal and the current gear position signal are not in the normal pattern compared with the shift pattern signal,
(Malfunction B) The next gear position signal and the current gear position signal are different even through the shift change signal is “OFF”.

Possible Cause

EBS003MJ

- Harness or connectors
  (CAN communication line circuit is open or shorted)
- TCM
- A/T unit assembly

DTC Confirmation Procedure

EBS003MK

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. Perform DTC confirmation procedure for DTC P1754, refer to AT-141, "DTC Confirmation Procedure" .
2. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-563 .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS003ML

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-40, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK TCM FUNCTION

Refer to AT-40, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 3.
NG >> Replace TCM. Refer to AT-7, "PRECAUTIONS" .

3. REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-65, "IVIS (Infiniti Vehicle Immobilizer System — NATS)" .
3. Perform EC-45, "Throttle Valve Closed Position Learning" .
4. Perform EC-45, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

EBS0036R

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

EBS0036S

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

EBS0036T

Malfunction is detected when a brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.

Possible Cause

EBS0036U

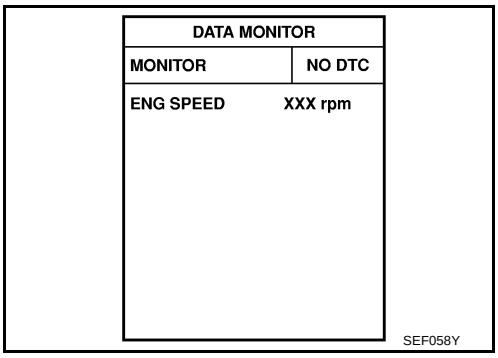
- Harness or connectors
  (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

DTC Confirmation Procedure

EBS0036V

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 “Diagnostic Procedure”, EC-567
   .



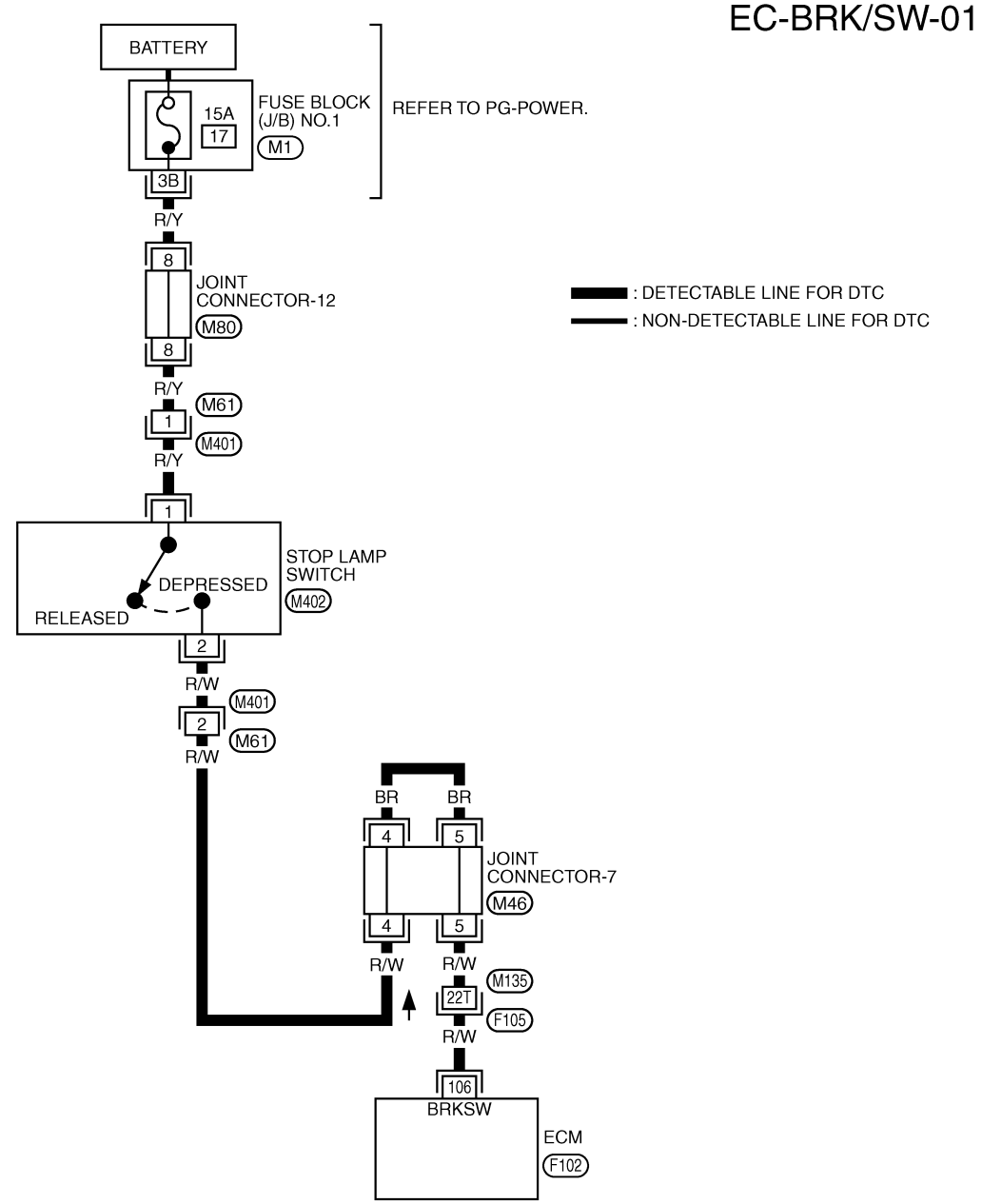
WITH GST

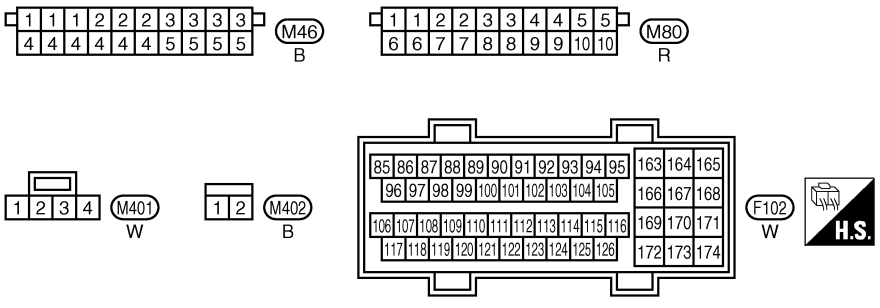
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0036W

EC-BRK/SW-01





REFER TO THE FOLLOWING.

F105 -SUPER MULTIPLE JUNCTION (SMJ)

M1 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1

TBWM0115E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
106	R/W	Stop lamp switch	**[Engine is running]** ● Brake pedal fully released	Approximately 0V
			[Engine is running] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS0036X

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the stop lamp when depressing and releasing the brake pedal.

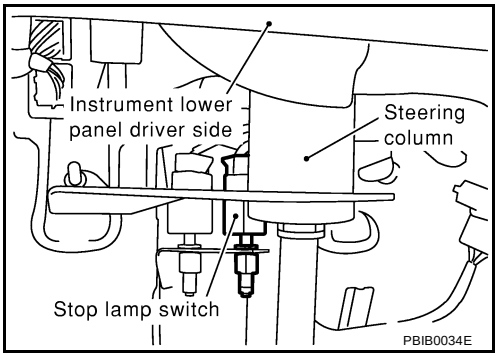
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

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

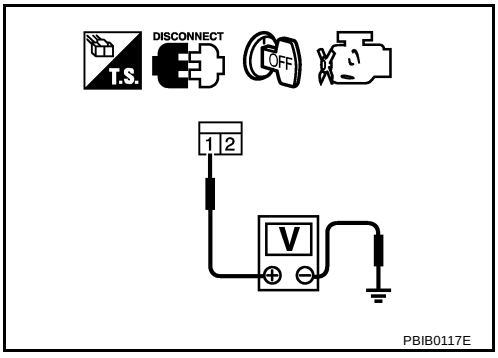
2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



2. 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.

- Harness connector M61, M401
- Joint connector-12
- 15A fuse
- Fuse block (J/B) No. 1 connector M1
- Harness for open and short between stop lamp switch and fuse

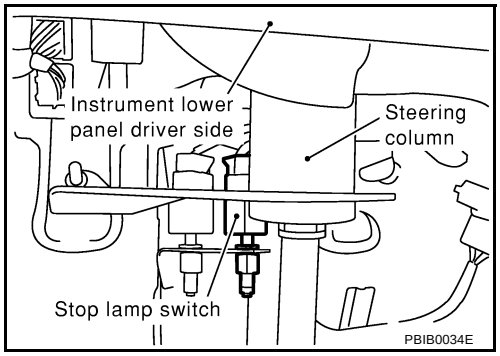
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect stop lamp switch harness connector.
4. Check harness continuity between ECM terminal 106 and stop lamp switch terminal 2.
   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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M401, M61
- Harness connectors M135, F105
- Joint connector-7
- 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 “Component Inspection”, EC-569 .

OK or NG

OK >> GO TO 7.
NG >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

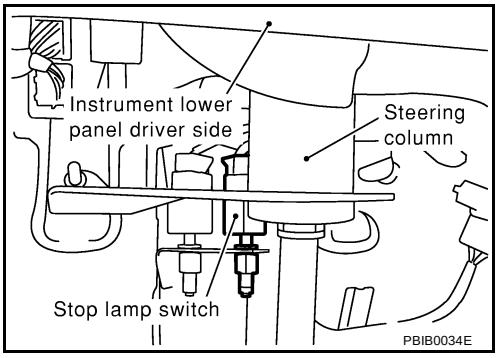
>> **INSPECTION END**

Component Inspection

EBS0036Y

STOP LAMP SWITCH

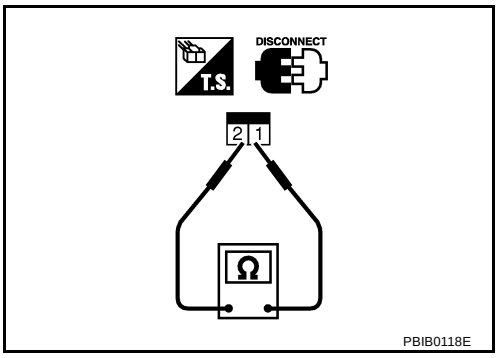
1. Disconnect stop lamp switch harness connector.



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.

3. If NG, replace stop lamp switch.



VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

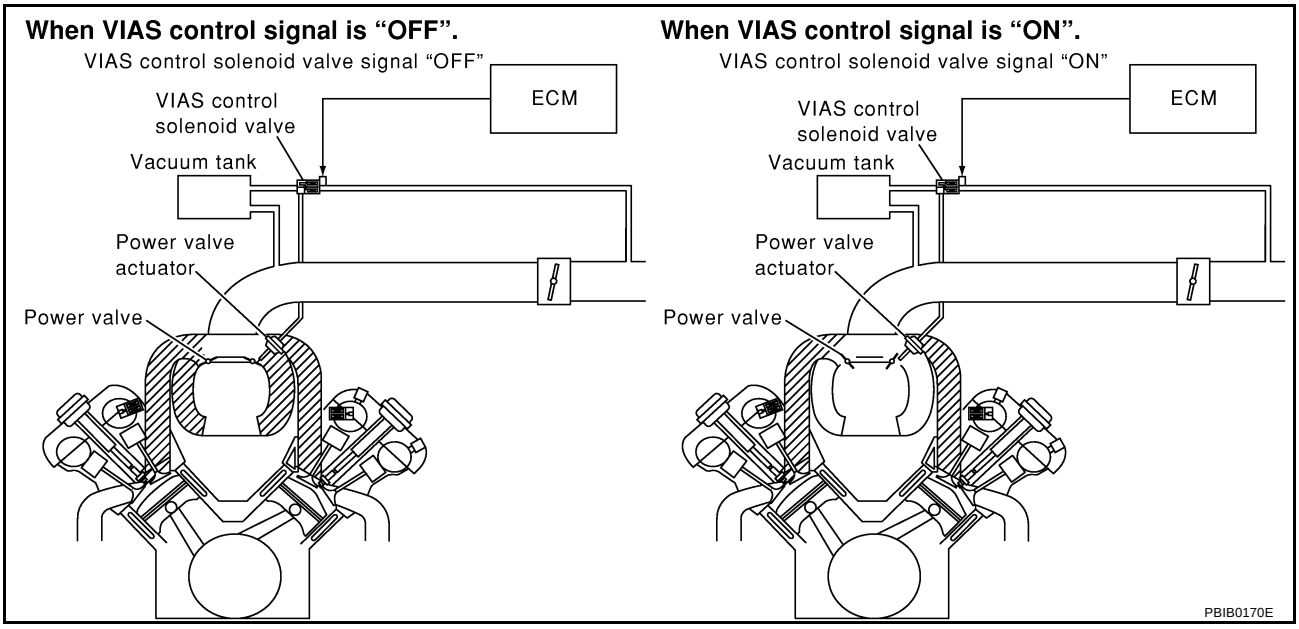
PFP:14956

Description

EBS001DO

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

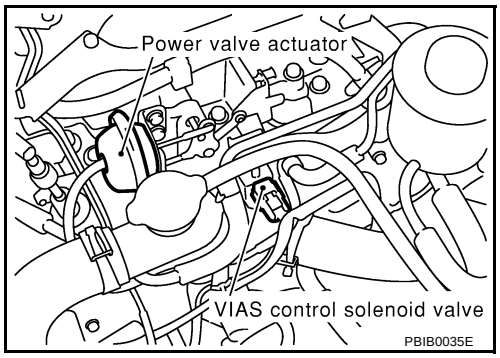
Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

For type III vehicle, (Refer to EC-9, "How to Check Vehicle Type" .), the power valve is always open regardless of the engine speed when gear position is in “N” or “P”.

COMPONENT DESCRIPTION

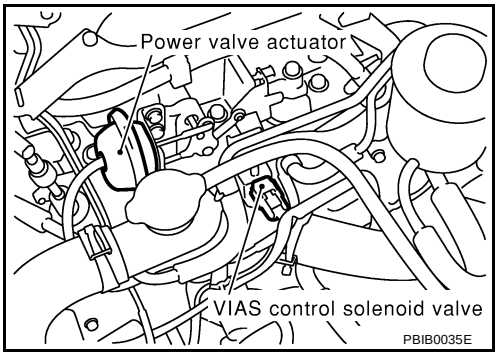
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

EBS001DP

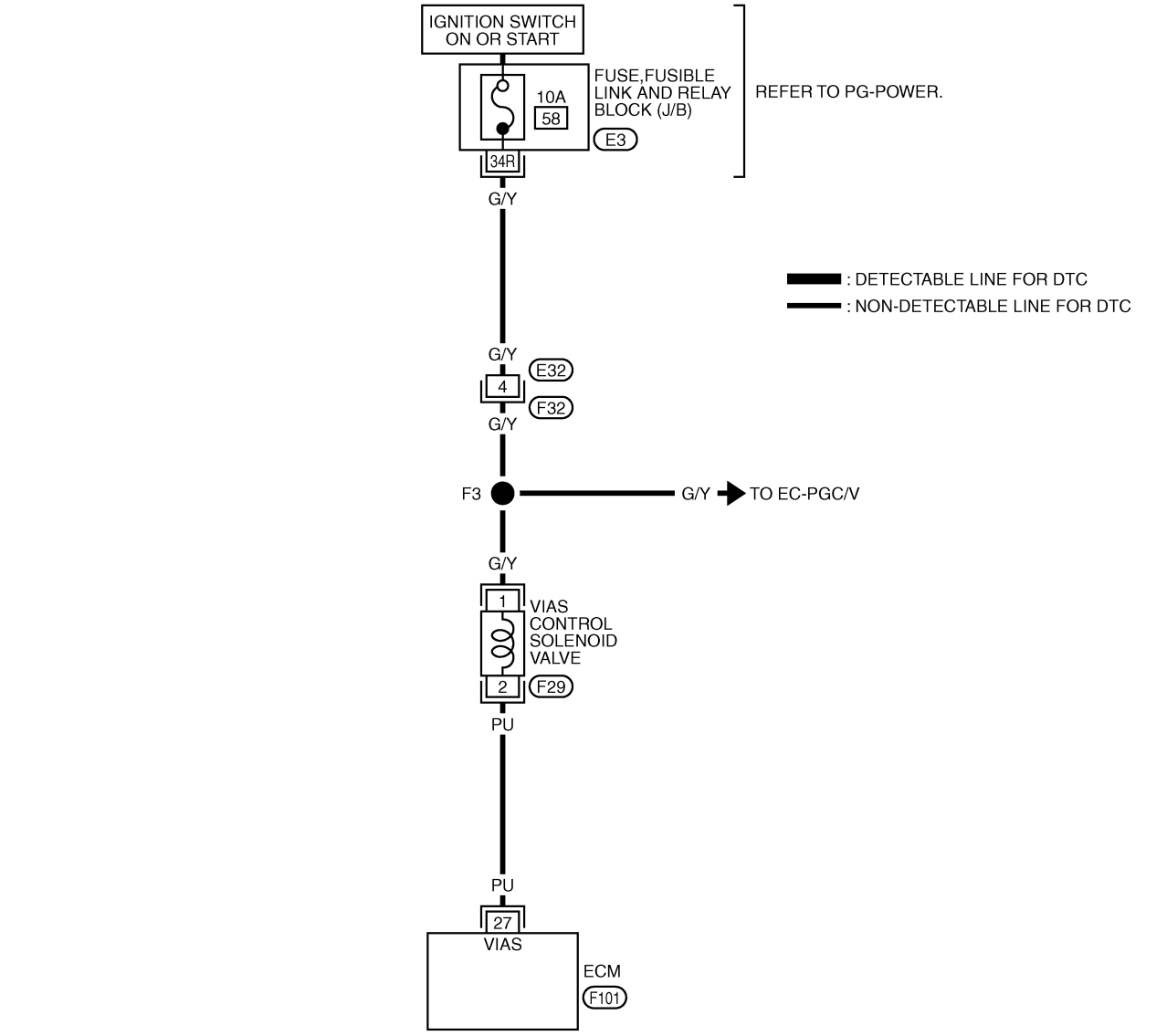
MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	**Vehicle type I and II*** ● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON
	Vehicle type III* ● Engine speed: Idle	Gear position: “P” or “N”	ON
		Except above	OFF

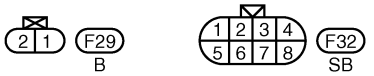
*: Refer to EC-9, "How to Check Vehicle Type" .

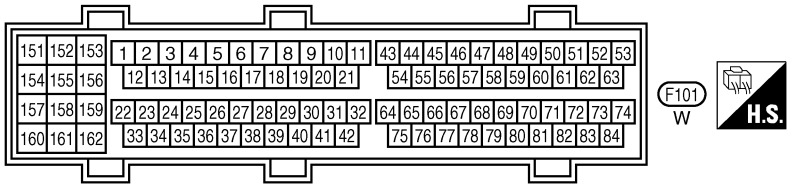
Wiring Diagram

EBS001DQ

EC-VIAS/V-01







REFER TO THE FOLLOWING.

E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0047E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27*1	PU	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
27*2	PU	VIAS control solenoid valve	**[Engine is running]** ● Gear position is “P” or “N”	0 - 1.0V
			[Engine is running] ● Gear position is “D”	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V

*1: For the type I or type II vehicle (Refer to EC-9, "How to Check Vehicle Type" .)
*2: For the type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .)

Diagnostic Procedure

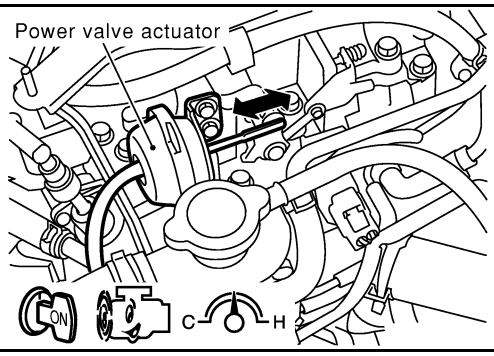
EBS001DR

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.

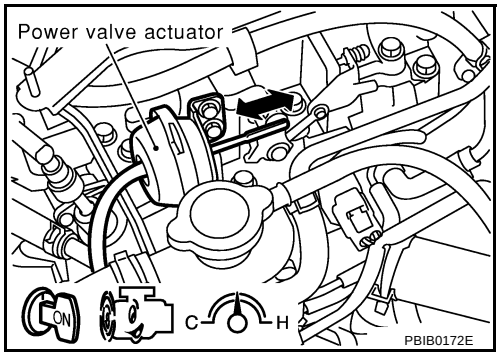
ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm



Without CONSULT-II

Type I and type II vehicles (Refer to EC-9, "How to Check Vehicle Type" .)

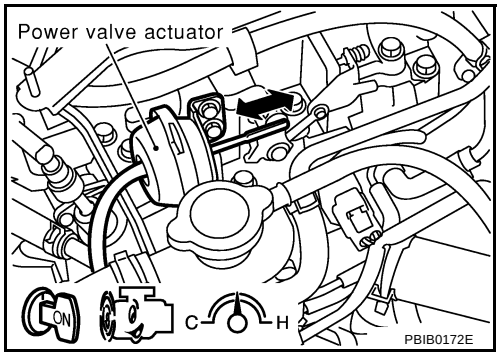
1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



Without CONSULT-II

Type III vehicle (Refer to EC-9, "How to Check Vehicle Type" .)

1. Lift up the vehicle.
2. Start engine and warm it up to normal operating temperature.
3. Make sure that power valve actuator rod moves when changing the gear position to “N” and “D” alternately.



OK or NG

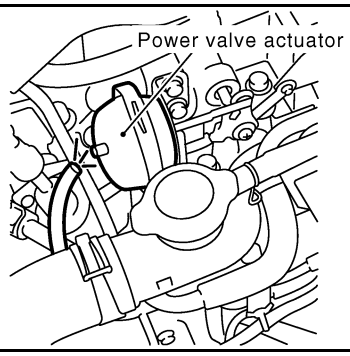
OK >> **INSPECTION END**
NG (With CONSULT-II)>>GO TO 2.
NG (Without CONSULT-II)>>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm



PBIB0174E

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

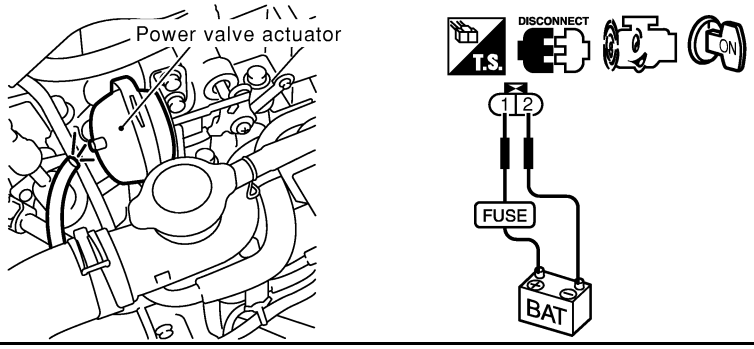
OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.



PBIB0175E

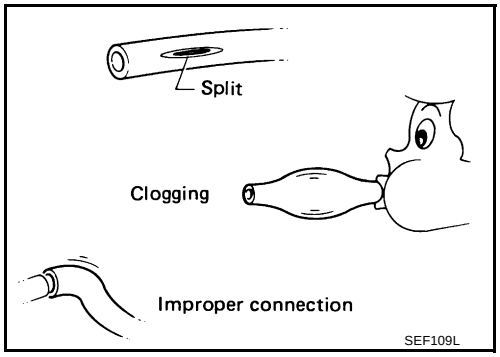
Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-24, "Vacuum Hose Drawing" .



OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.

5. CHECK VACUUM TANK

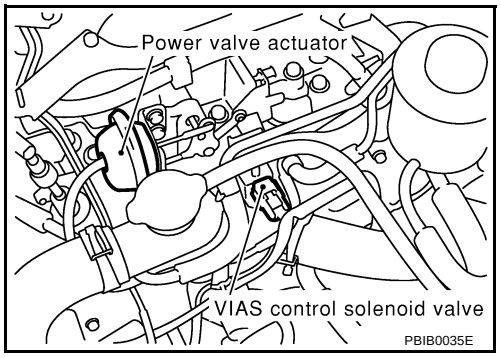
Refer to “Component Inspection”, EC-578 .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

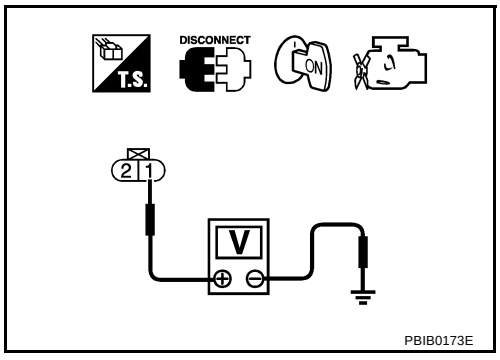
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch “ON”.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E32, F32
- Fuse, fusible link and relay block (J/B) connector E3
- 10A fuse
- Harness continuity between fuse and VIAS control solenoid valve

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 27 and terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to “Component Inspection”,EC-577 .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Component Inspection

EBS001DS

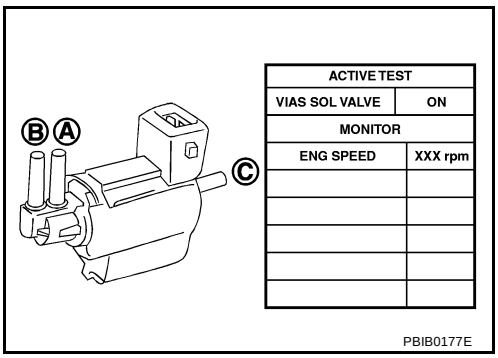
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

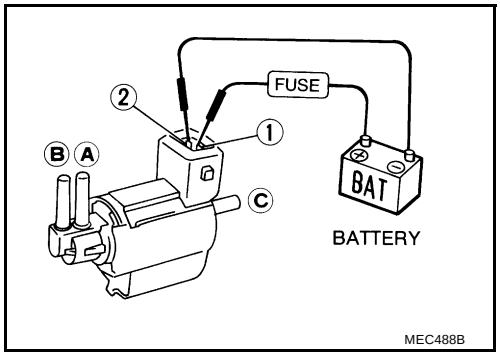
Operation takes less than 1 second.



With GST

Check air passage continuity and operation delay time under the following conditions.

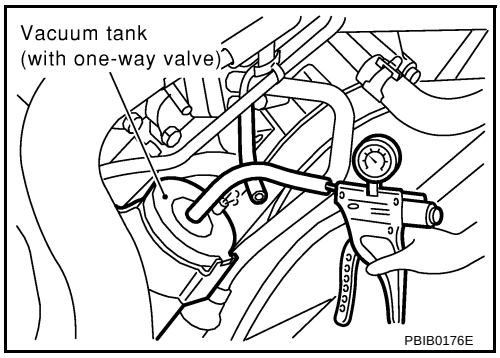
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes



Operation takes less than 1 second.

VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



Removal and Installation

EBS001DT

VIAS CONTROL SOLENOID VALVE

Refer to EM-17, "INTAKE MANIFOLD" .

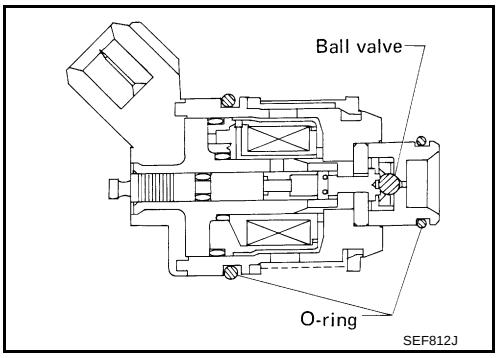
INJECTOR CIRCUIT

PFP:16600

Component Description

EBS001DU

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

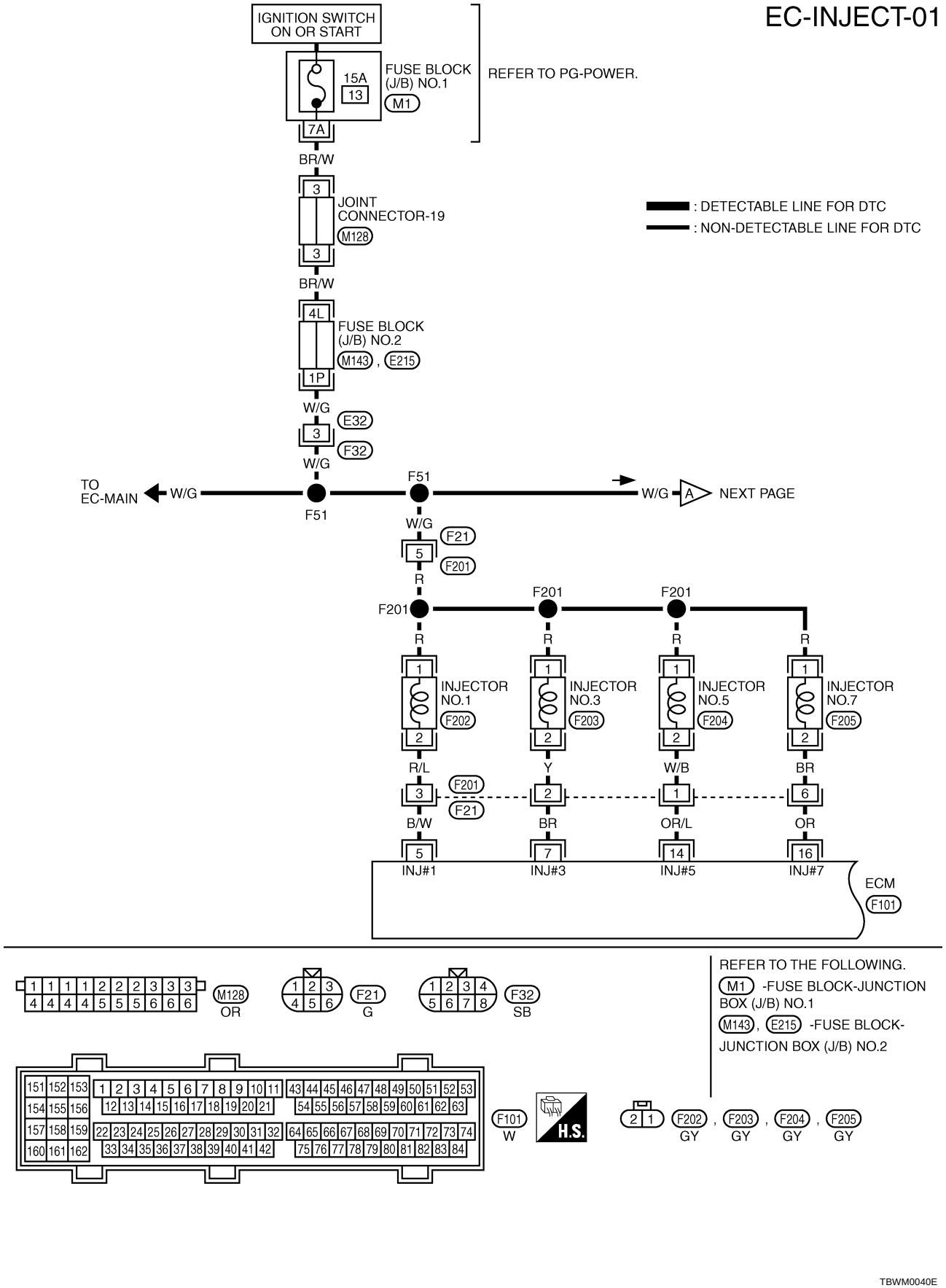
EBS001DV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 mg/s
		2,000 rpm	1.9 - 2.9mg/s
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N ● Air conditioner switch: OFF ● No-load	Idle	2.3 - 2.9 msec
		2,000 rpm	2.3 - 2.9msec

Wiring Diagram

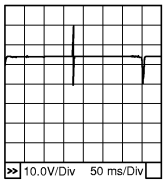
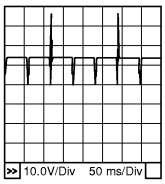
EBS001DW



TBWM0040E

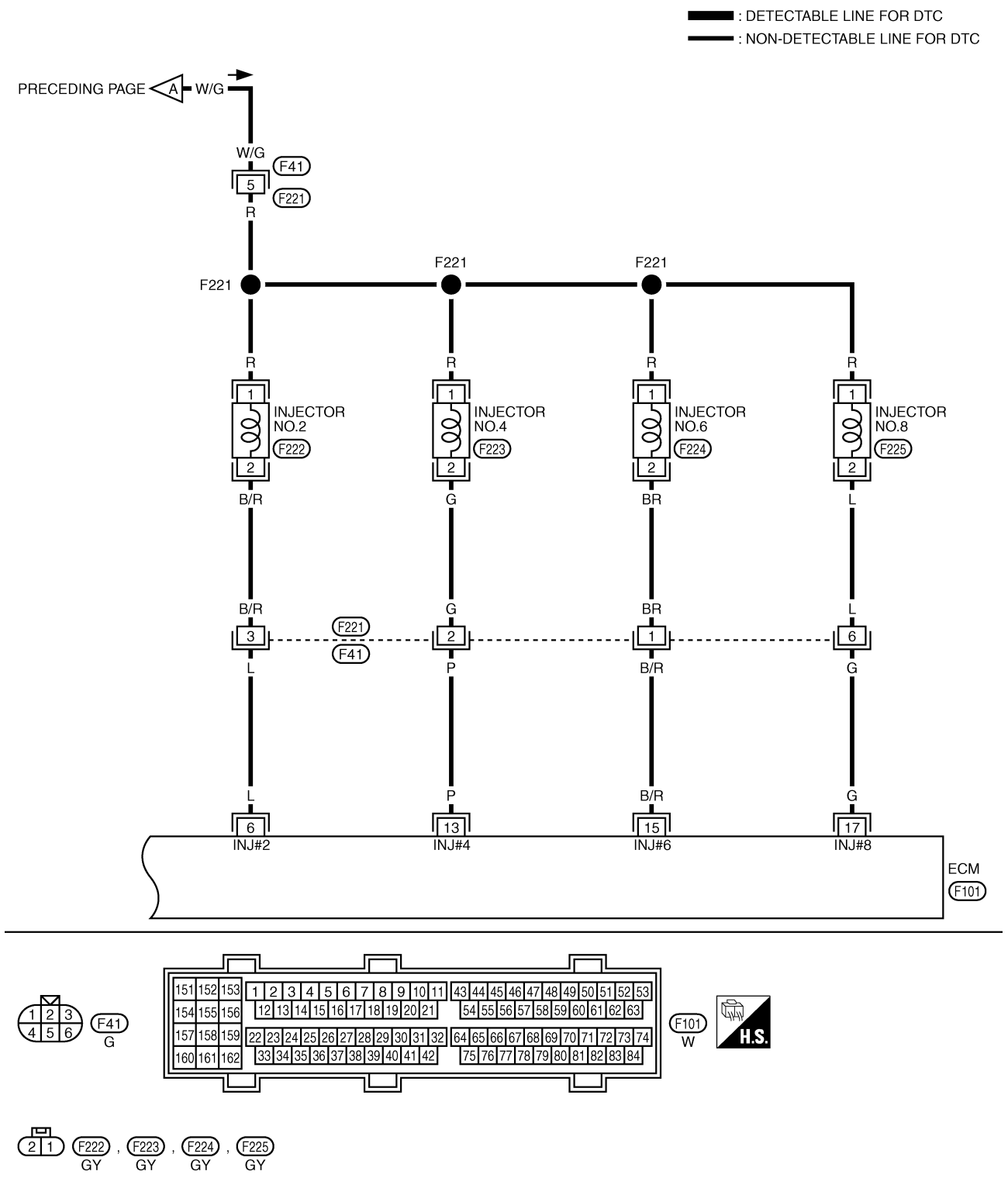
Specification data are reference values and are measured between each terminal and body ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5 7 14 16	B/W BR OR/L OR	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 7	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0042E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0043E

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

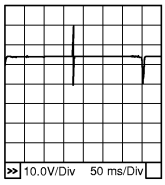
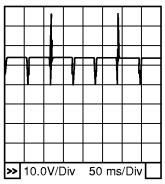
EC-INJECT-02



TBWM0041E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6 13 15 17	L P B/R G	Injector No. 2 Injector No. 4 Injector No. 6 Injector No. 8	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0042E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0043E

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

Diagnostic Procedure

EBS001DX

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

With CONSULT-II

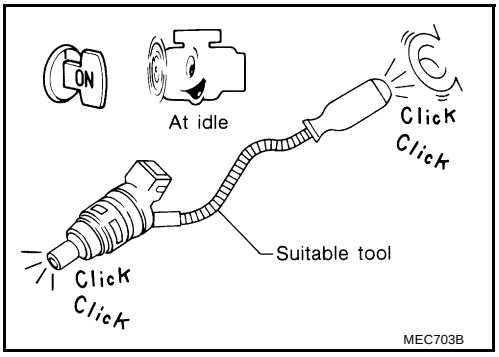
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

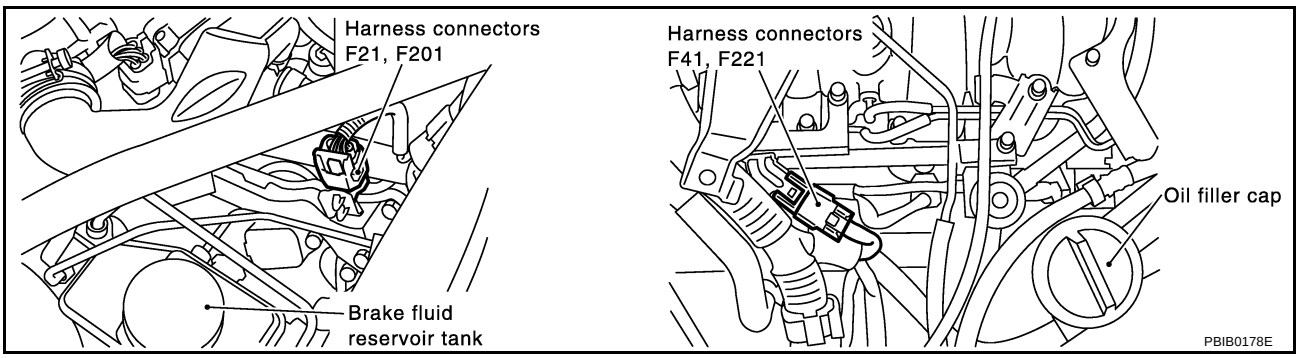


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

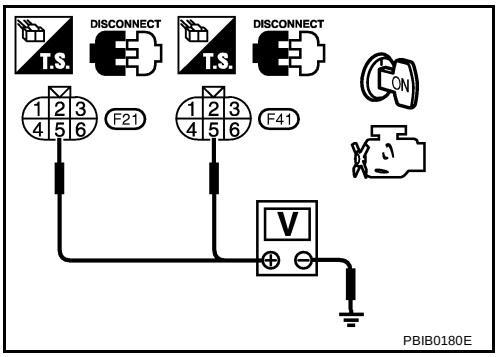
3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect harness connectors F21, F201 (bank 1) and harness connectors F41, F221 (bank 2).



3. Turn ignition switch “ON”.
4. Check voltage between harness connector F21 terminal 5 and ground, harness connector F41 terminal 5 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 E32, F32
- Harness connectors F21, F201
- Harness connectors F41, F221
- Joint connector-19
- Fuse block (J/B) No. 1 connector M1
- Fuse block (J/B) No. 2 connectors M143, E215
- 15A fuse
- Harness for open or short between harness connector F21 and fuse
- Harness for open or short between harness connector F41 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 the following terminals. Refer to Wiring Diagram.

Harness connector	Terminal	ECM terminal
F21	3	5
	2	7
	1	14
	6	16
F41	3	6
	2	13
	1	15
	6	17

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 shot to power in harness or connectors.

6. CHECK SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect injector harness connectors.
2. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Harness connector	Terminal	Injector terminal
F21	5	1
	1, 2, 3, 6	2
F41	5	1
	1, 2, 3, 6	2

Continuity should exist.

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 INJECTOR

Refer to “Component Inspection”, EC-586 .

OK or NG

OK >> GO TO 9.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

Component Inspection

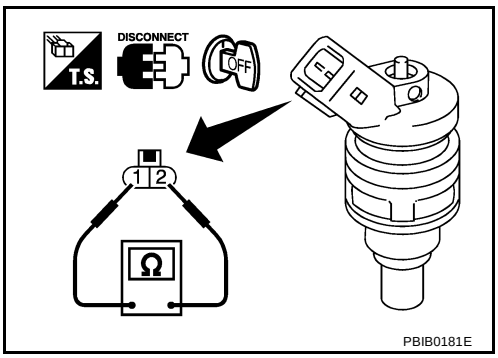
EBS001DY

INJECTOR

1. Disconnect injector harness connector.

2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 20°C (68°F)]



Removal and Installation

EBS001DZ

INJECTOR

Refer to EM-30, "FUEL INJECTOR AND FUEL TUBE" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

EBS001E0

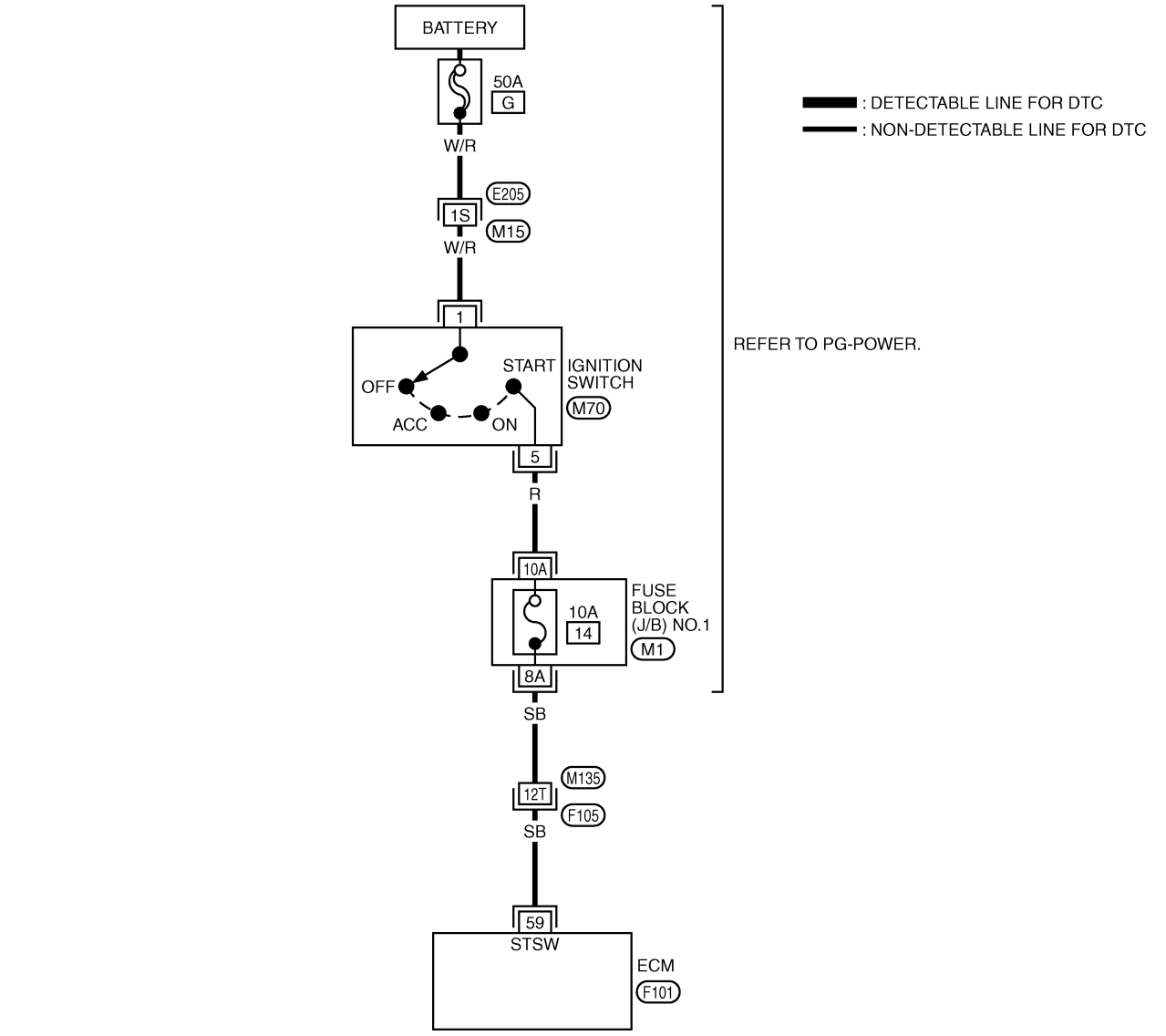
Specification data are reference values.

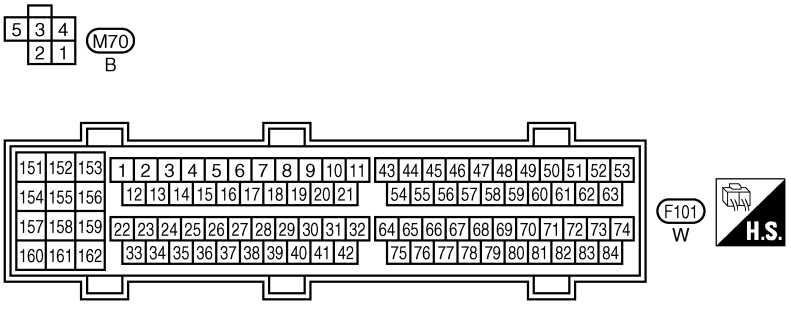
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

EBS001E1

EC-S/SIG-01





REFER TO THE FOLLOWING.
E205 , F105 -SUPER MULTIPLE JUNCTION (SMJ)
M1 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1

TBWM0042E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	SB	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 14V

Diagnostic Procedure

EBS001E2

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

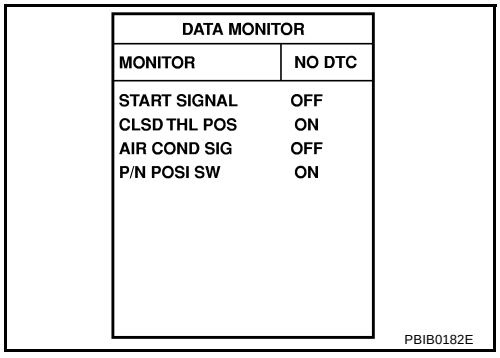
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "ON".
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

Condition	START SIGNAL
Ignition switch "ON"	OFF
Ignition switch "OFF"	ON



OK or NG

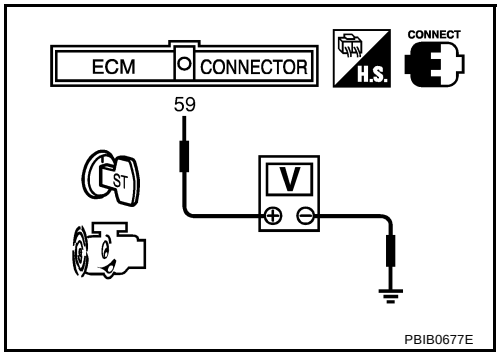
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 59 and ground under the following conditions.

Condition	Voltage
Ignition switch "START"	Battery voltage
Other positions	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK STARTING SYSTEM

Turn ignition switch "OFF", then turn it to "START".
Does starter motor operate?

Yes or No

Yes >> GO TO 5.
No >> Refer to SC-20, "STARTING SYSTEM" .

5. CHECK FUSE

1. Turn ignition switch “OFF”.
2. Disconnect 10A fuse.
3. Check if 10A fuse is OK.

OK or NG

OK >> GO TO 6.
NG >> Replace 10A fuse.

6. CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect ignition switch harness connector.
3. Check harness continuity between ECM terminal 59 and fuse block (J/B) No. 1, ignition switch and fuse block (J/B) No.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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M135, F105
- Fuse block (J/B) No. 1 connector M1
- Harness for open or short between ignition switch and fuse block (J/B) No. 1
- Harness for open or short between ECM and fuse block (J/B) No. 1

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

8. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”,EC-142 .

>> **INSPECTION END**

FUEL PUMP CIRCUIT

PFP:17042

Description

EBS001E3

SYSTEM DESCRIPTION

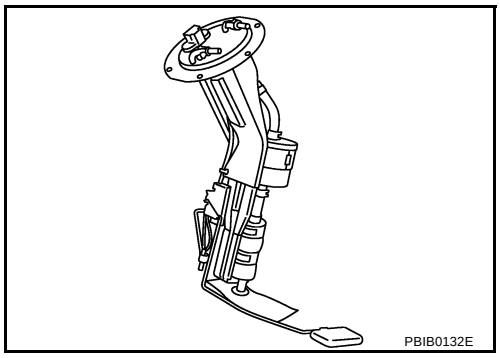
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Fuel pump control	Fuel pump relay
Camshaft position sensor (PHASE)	Engine speed		
Ignition switch	Start signal		

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 10° signal from the crankshaft position sensor (POS), it knows that the engine is rotating, and causes the pump to operate. If the 10° 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

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).



CONSULT-II Reference Value in Data Monitor Mode

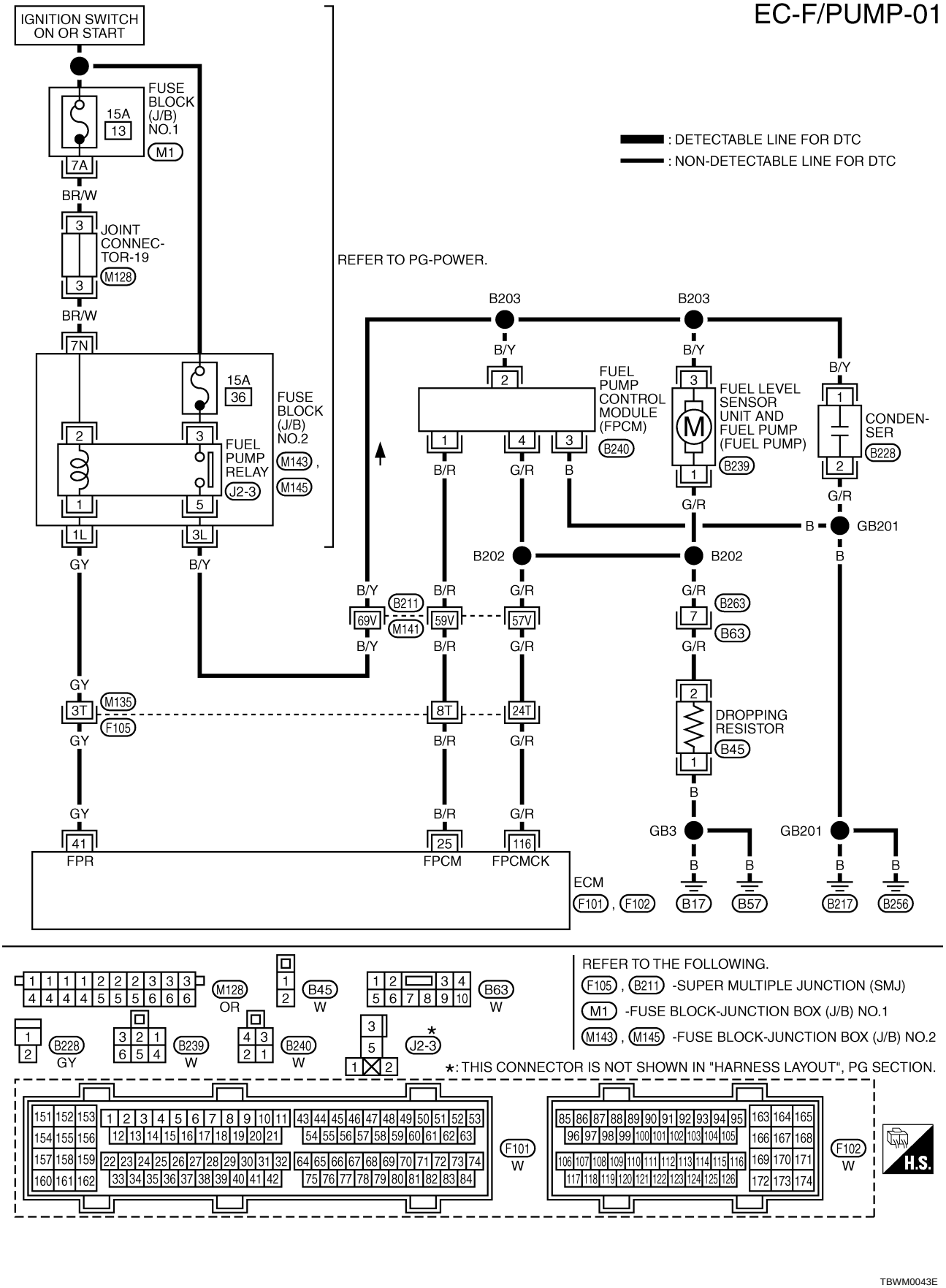
EBS001E4

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 5 seconds after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

EBS001E5



TBWM0043E

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

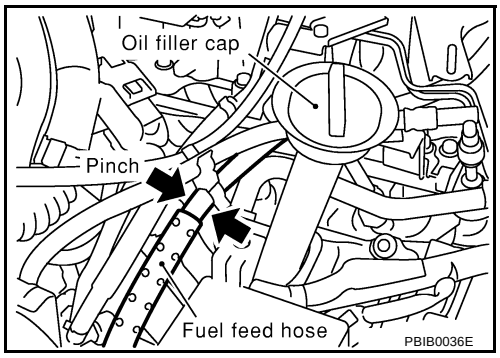
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GY	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS001E6

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 feed hose for 5 second after ignition switch is turned "ON".

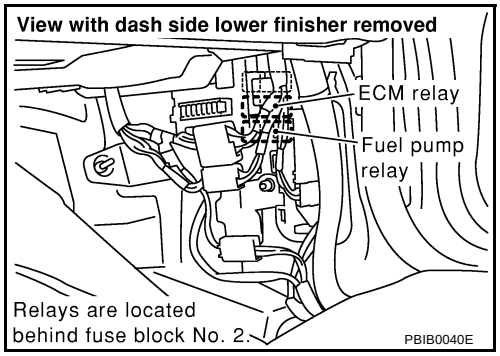


OK or NG

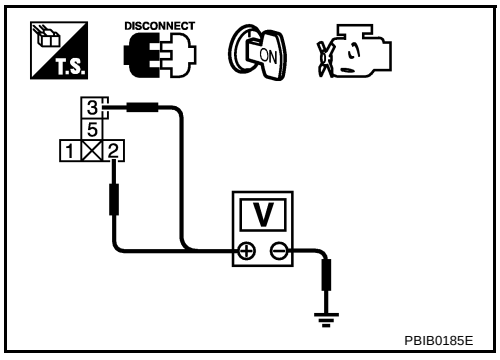
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".



4. Check voltage between terminals 2, 3 and ground with CONSULT-II or tester.



OK or NG

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

3. DETECT MALFUNCTIONING PART

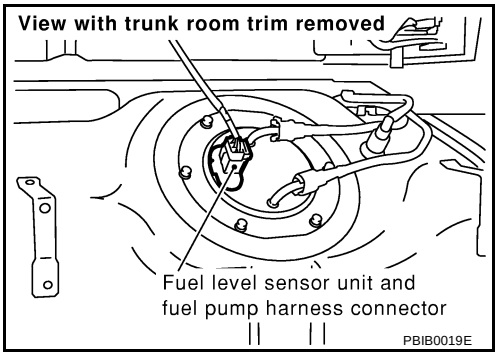
Check the following.

- Fuse block (J/B) No. 1 connector M1
- Fuse block (J/B) No. 2 connectors M143, M145
- Joint connector-19
- 15A fuses
- Harness for open or short between fuse and fuel pump relay

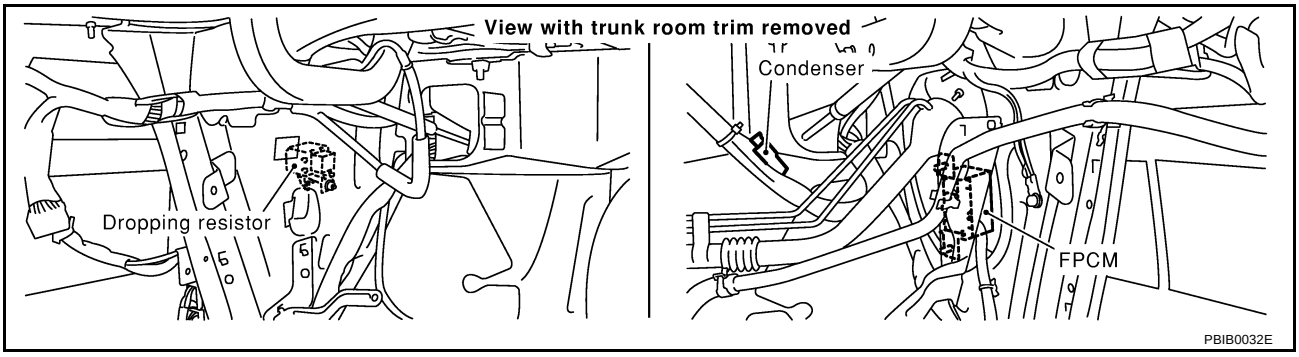
>> Repair harness or connectors.

4. 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. Disconnect dropping resistor harness connector.



4. Check harness continuity between
fuel pump relay terminal 5 and fuel pump terminal 3,
fuel pump terminal 1 and dropping resistor terminal 2,
dropping resistor terminal 1 and body ground.
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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B211, M141
- Harness connectors B63, B263
- Fuse block (J/B) No. 2 connectors M143, M145
- Harness for open or short between fuel pump relay and fuel pump
- Harness for open or short between fuel pump and dropping resistor
- Harness for open or short between dropping resistor and body ground

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

6. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 41 and fuel pump relay 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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M135, F105
- Harness for open or short between ECM and fuel pump relay

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

8. CHECK DROPPING RESISTOR

Refer to “Component Inspection”, EC-597 .

OK or NG

OK >> GO TO 9.
NG >> Replace dropping resistor.

9. CHECK FUEL PUMP RELAY

Refer to “Component Inspection”, EC-597 .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump relay.

10. CHECK FUEL PUMP

Refer to “Component Inspection”, EC-597 .

OK or NG

OK >> GO TO 11.
NG >> Replace fuel pump.

11. CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

>> **INSPECTION END**

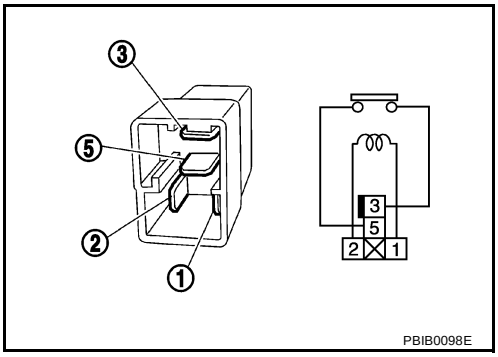
Component Inspection

EBS001E7

FUEL PUMP RELAY

Check continuity between terminals 3 and 5 under the following conditions.

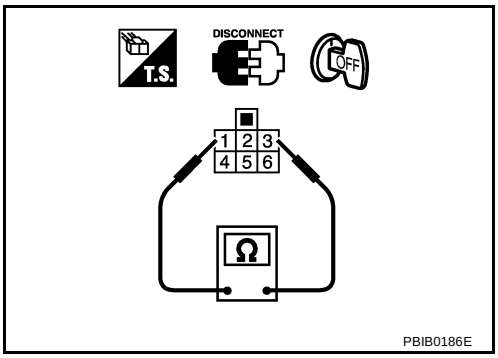
Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 3.

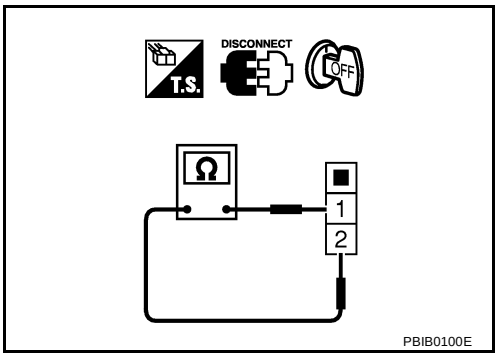
Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]



DROPPING RESISTOR

Check resistance between dropping resistor terminals 1 and 2.

Resistance: Approximately 0.9Ω at 20°C (68°F)



Removal and Installation

EBS001E8

FUEL PUMP

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

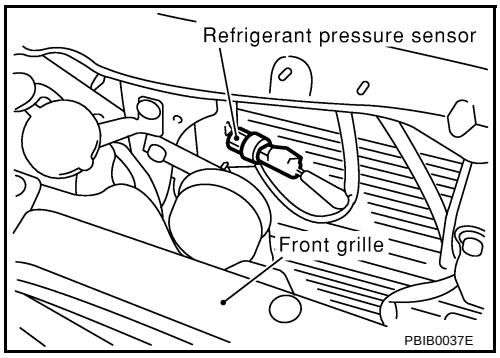
REFRIGERANT PRESSURE SENSOR

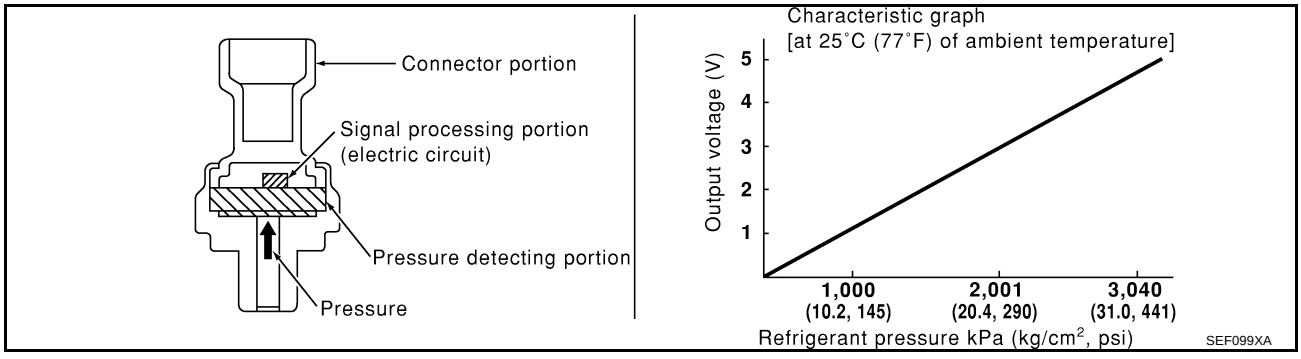
PFP:92136

Component Description

EBS001G0

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.

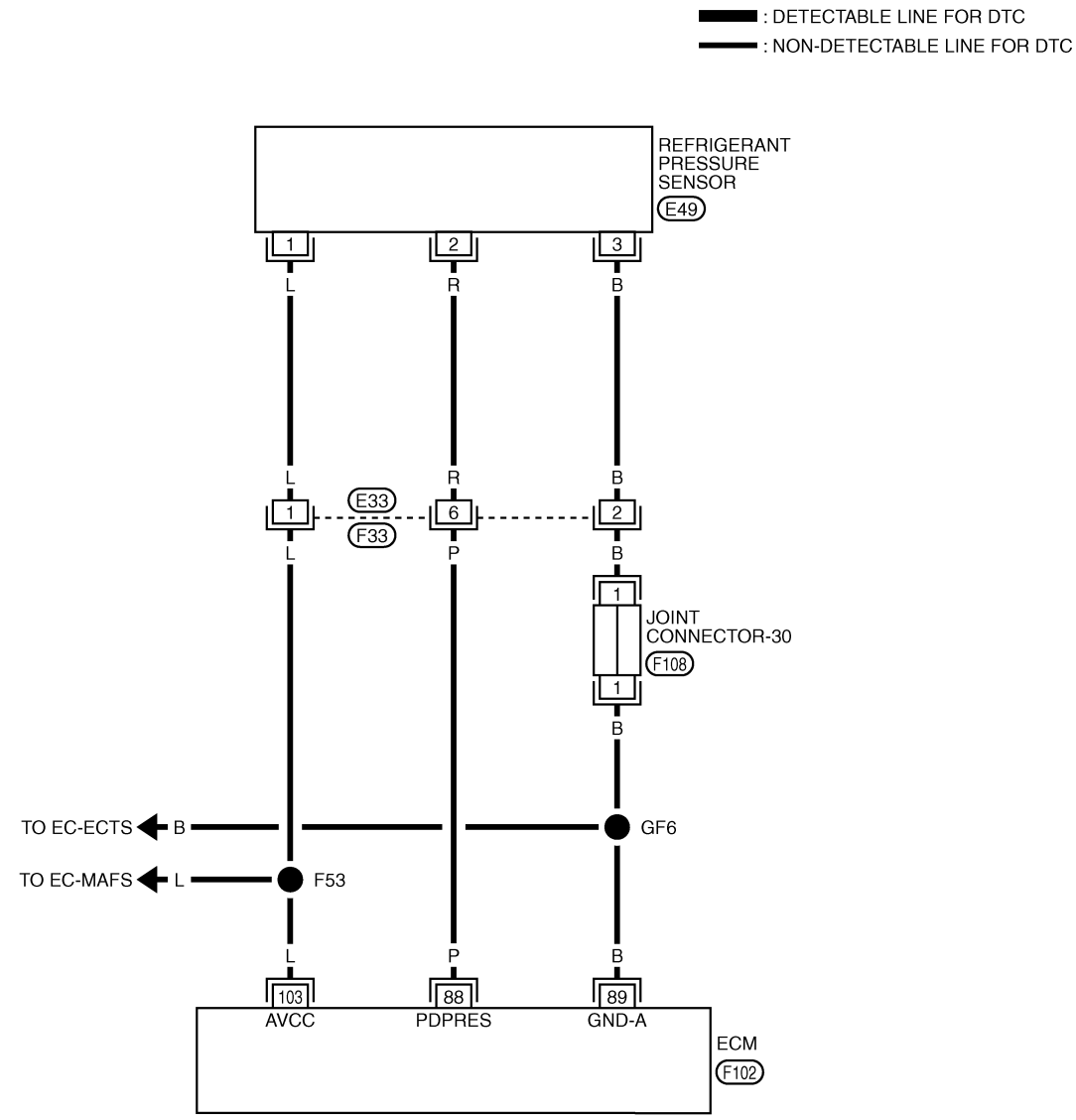


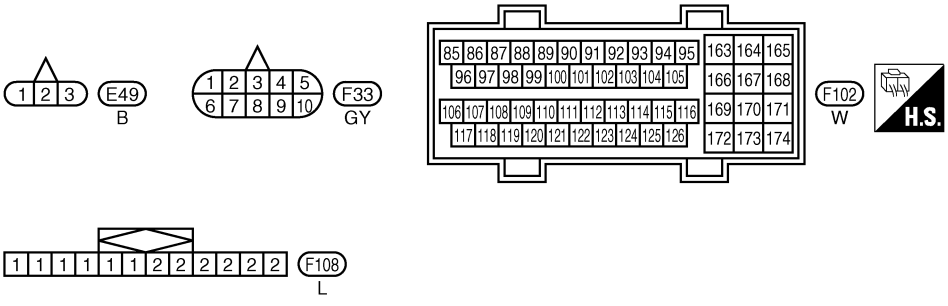


Wiring Diagram

EBS001G1

EC-RP/SEN-01





TBWM0045E

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
88	P	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are “ON”. (Compressor operates.)	1.0 - 4.0V
89	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
103	L	Sensors' power supply	**[Ignition switch “ON”]**	Approximately 5V

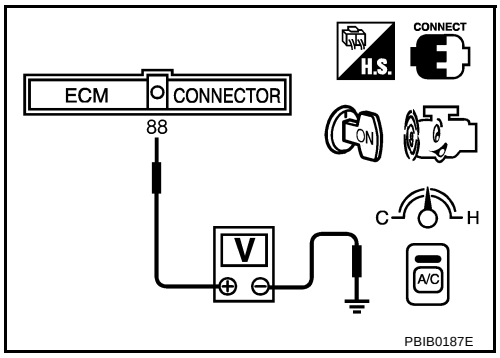
Diagnostic Procedure

EBS001G2

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 88 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

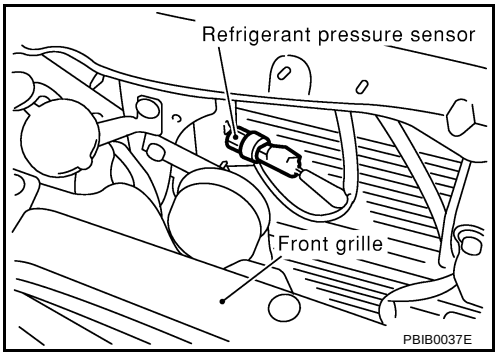


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

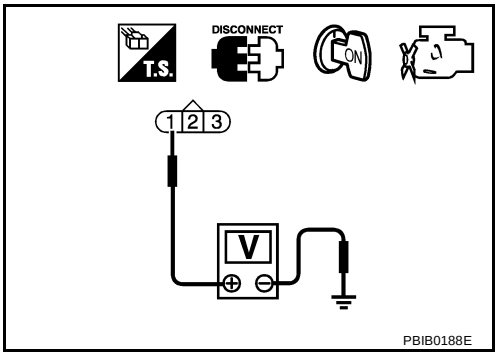
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

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 1 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 E33, F33
- 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. Check harness continuity between refrigerant pressure sensor terminal 3 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 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E33, F33
- Joint connector-30
- 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.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 88 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E33, F33
- 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 “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142 .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

EBS001G3

REFRIGERANT PRESSURE SENSOR

Refer to ATC-132, "REFRIGERANT LINES" .

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

EBS003CK

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from combination meter to ECM.

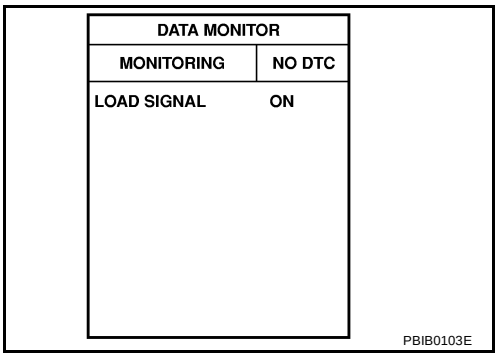
Diagnostic Procedure

EBS001EK

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch “ON”.
2. Connect CONSULT-II or GST 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



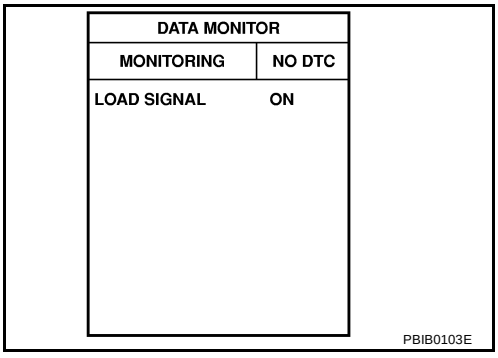
OK or NG

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

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” indication under the following conditions.

Condition	Indication
Lighting switch “ON” at 2nd position	ON
Lighting switch “OFF”	OFF



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

3. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn “ON” the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes >> GO TO 4.
No >> Check rear window defogger circuit. Refer to GW-53, "REAR WINDOW DEFOGGER" .

4. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Check the circuit for open and short between combination meter and rear window defogger. Refer to DI-14, "Wiring Diagram — LOAD/S —" .

OK or NG

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

5. CHECK COMBINATION METER

Refer to DI-5, "COMBINATION METERS" .

OK or NG

OK >> GO TO 9.
NG >> Replace combination meter.

6. CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn “ON” the lighting switch at 2nd position.
3. Check that headlamp high beams are illuminated.

OK or NG

OK >> GO TO 7.
NG >> Check headlamp circuit. Refer toLT-5, "HEADLAMP (FOR USA)" or LT-36, "HEADLAMP (FOR CANADA) - DAYTIME LIGHT SYSTEM -" .

7. CHECK HEADLAMP INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Check the circuit for open and short between combination meter and headlamp.
   Refer to DI-14, "Wiring Diagram — LOAD/S —" .
3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

8. CHECK COMBINATION METER

Refer to DI-5, "COMBINATION METERS" .

OK or NG

OK >> GO TO 9.
NG >> Replace combination meter.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-142, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

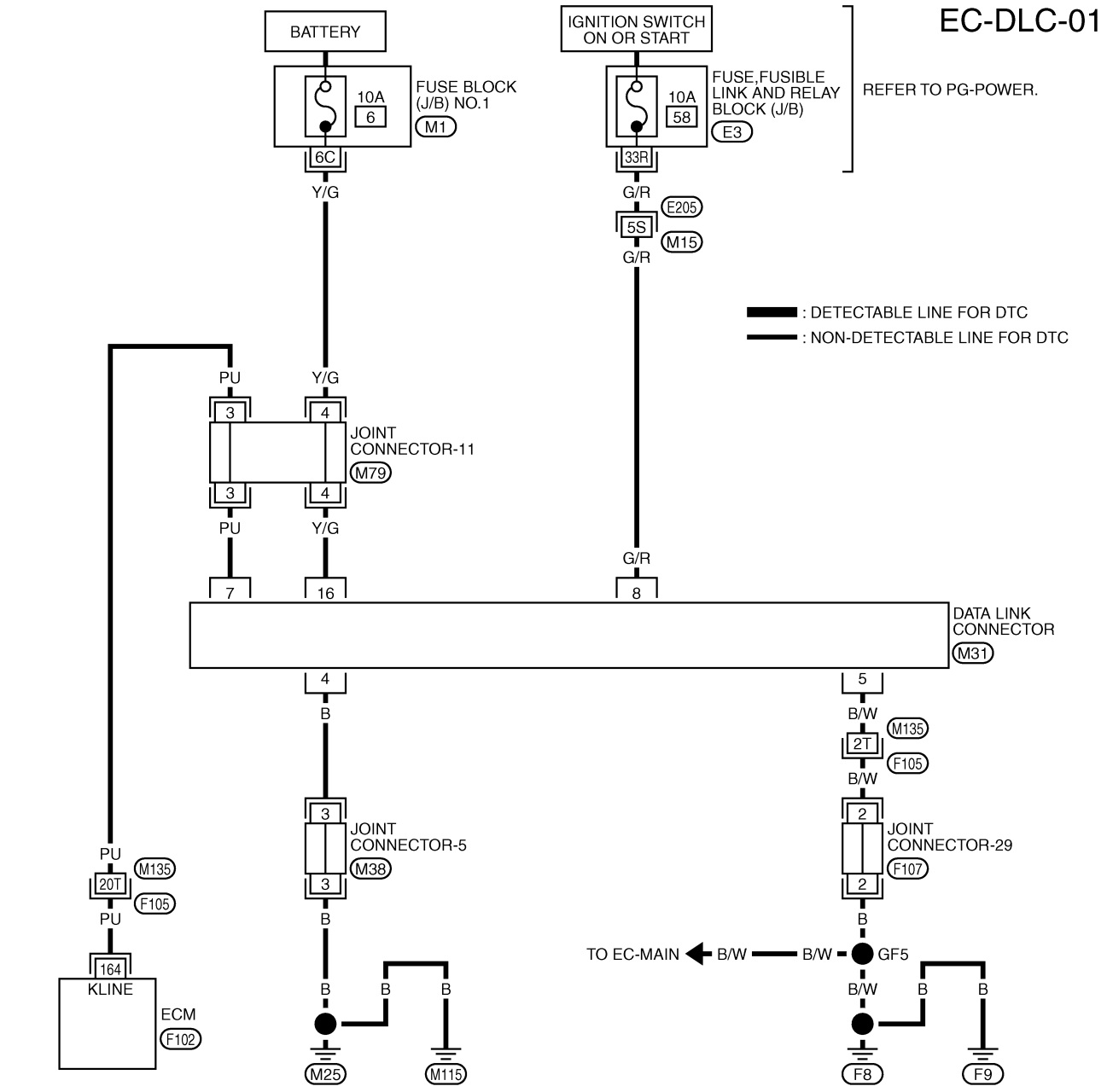
>> **INSPECTION END**

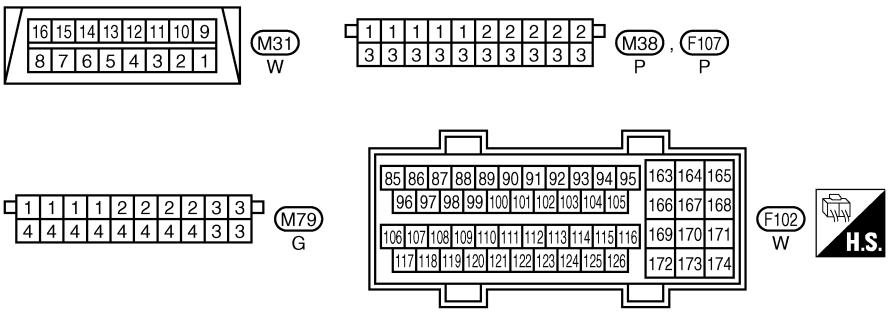
DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

EBS002LT





REFER TO THE FOLLOWING.
E205 , F105 -SUPER MULTIPLE JUNCTION (SMJ)
M1 -FUSE BLOCK-JUNCTION BOX (J/B) NO.1
E3 -FUSE,FUSIBLE LINK AND RELAY BLOCK (J/B)

TBWM0057E

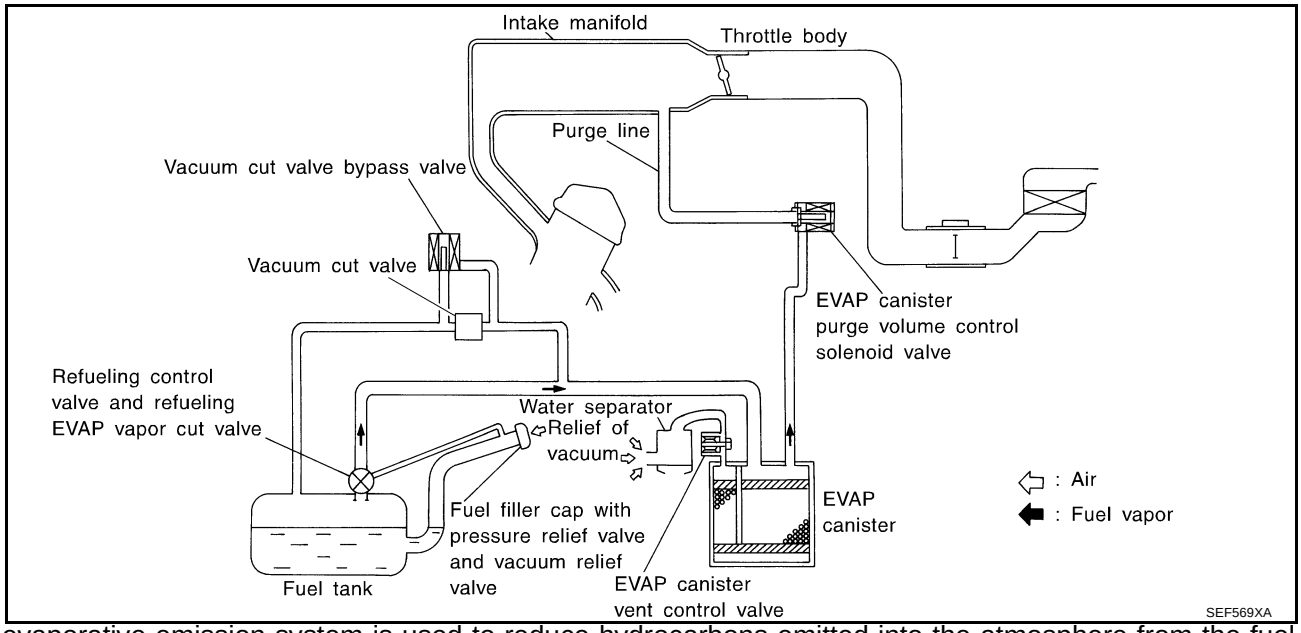
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

EBS001EL

SYSTEM DESCRIPTION



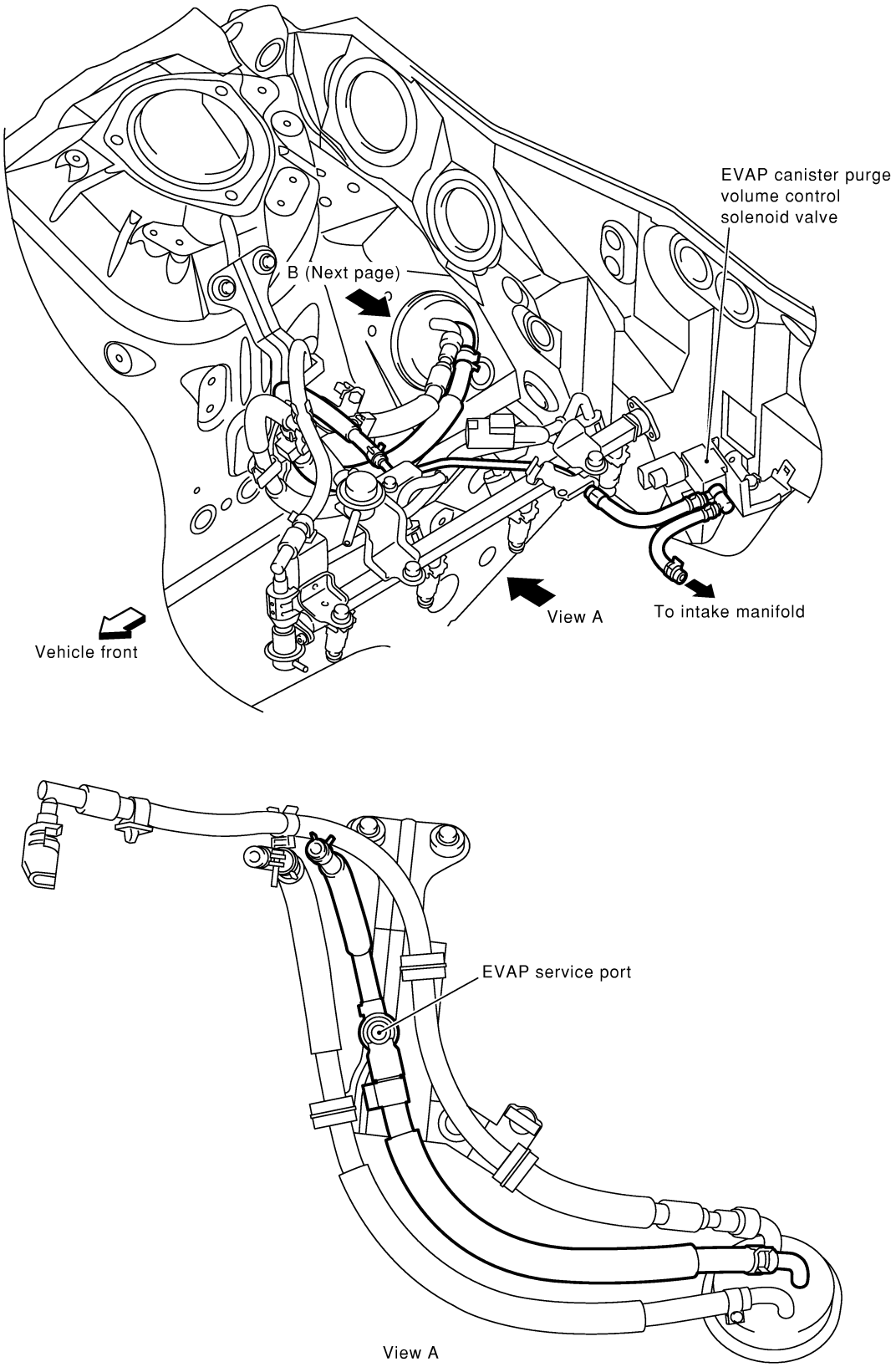
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

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

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

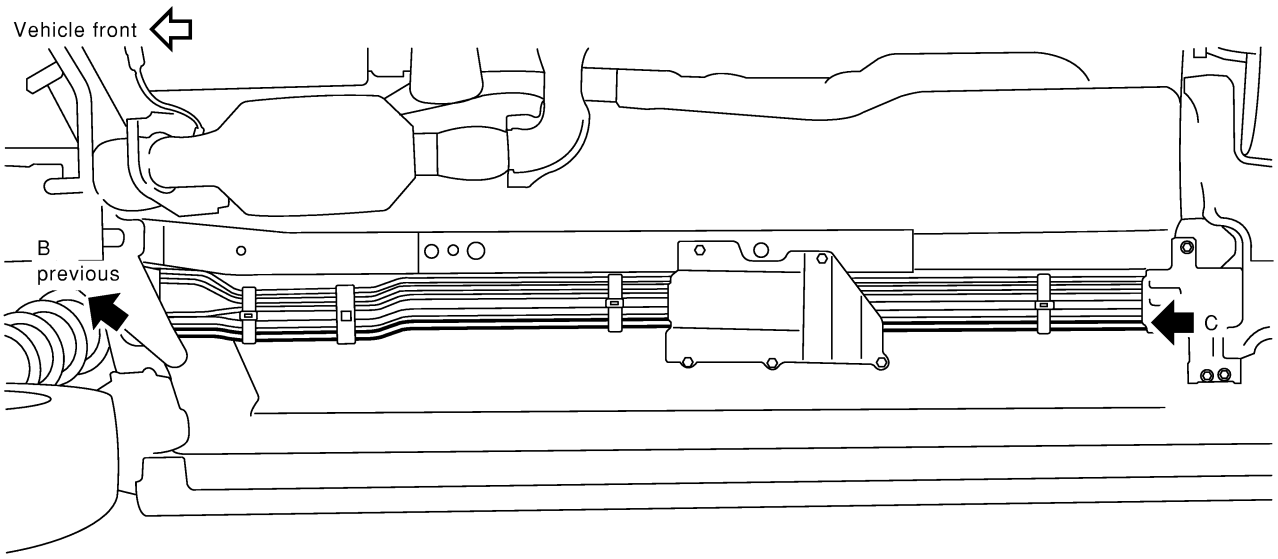
EVAPORATIVE EMISSION LINE DRAWING

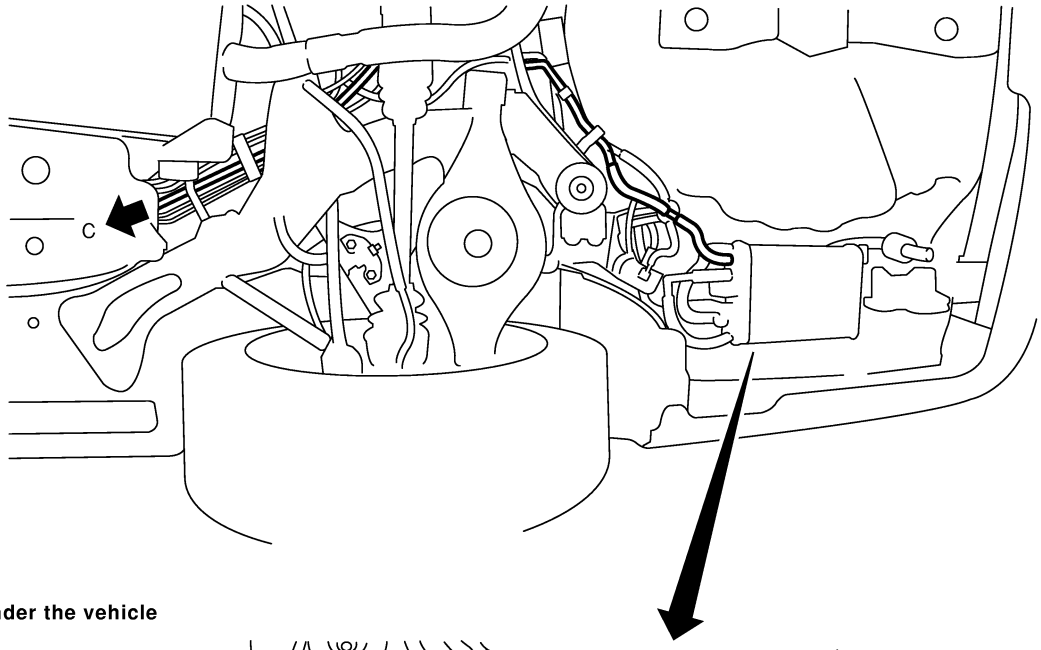


NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

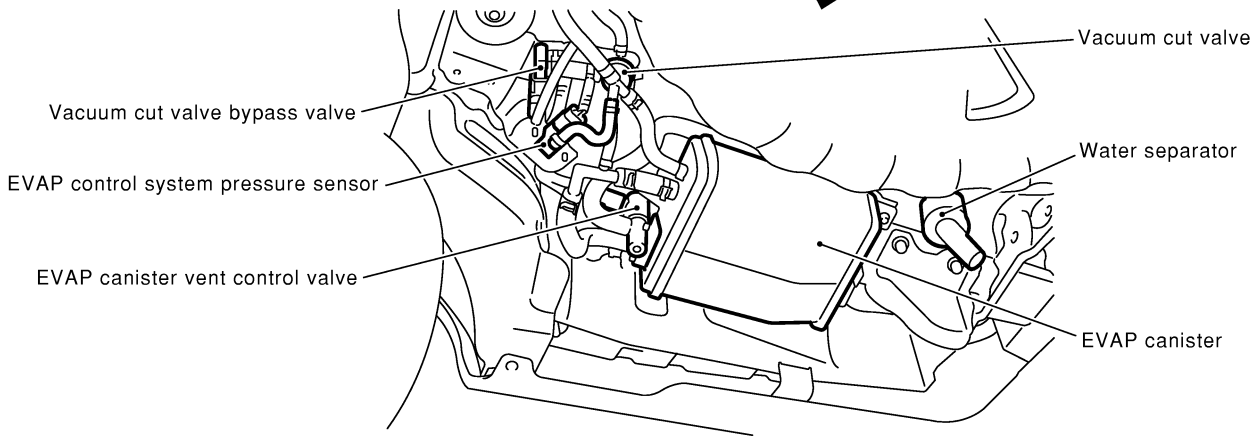
PBIB0008E

View from under the vehicle





View from under the vehicle



PBIB0009E

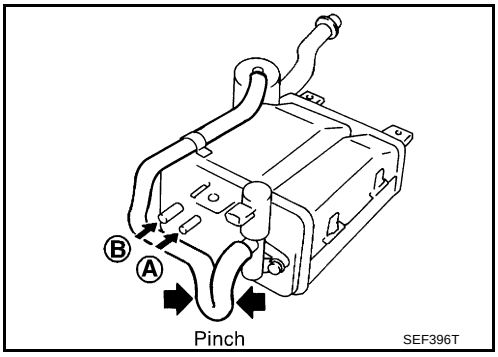
Component Inspection

EBS001EM

EVAP CANISTER

Check EVAP canister as follows:

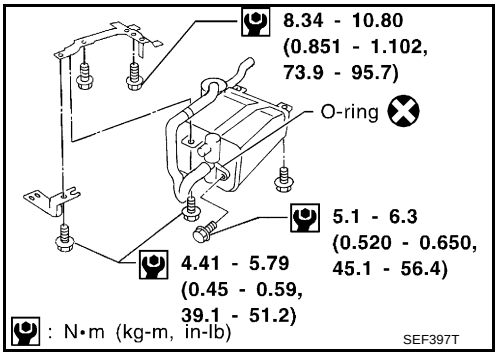
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .



Tightening Torque

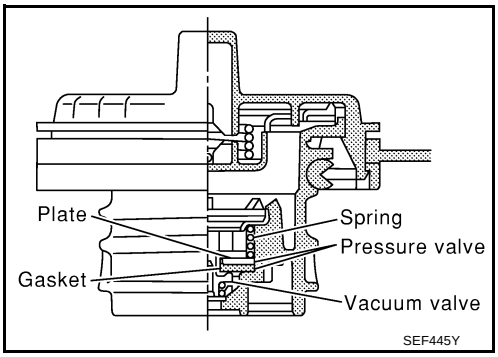
Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



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

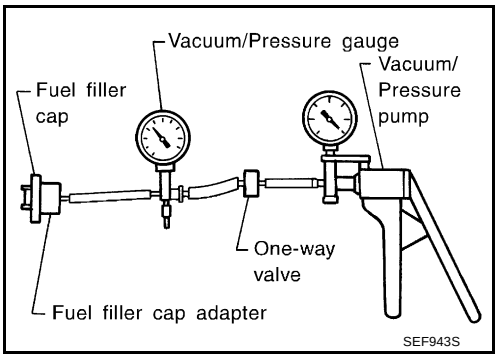
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure:	**15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)**
Vacuum:	**–6.0 to –3.3 kPa (–0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)**

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



CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-553 .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

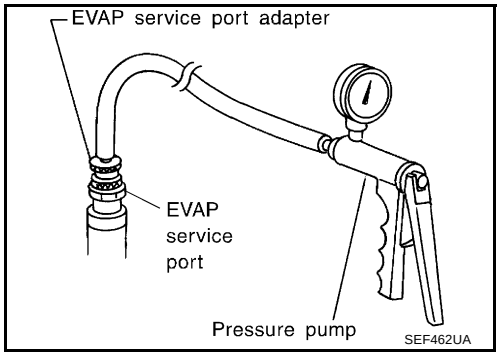
Refer to EC-365 .

FUEL TANK TEMPERATURE SENSOR

Refer to EC-316 .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

EBS001EN

CAUTION:

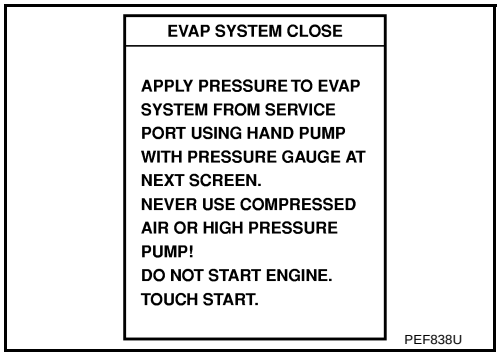
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

NOTE:

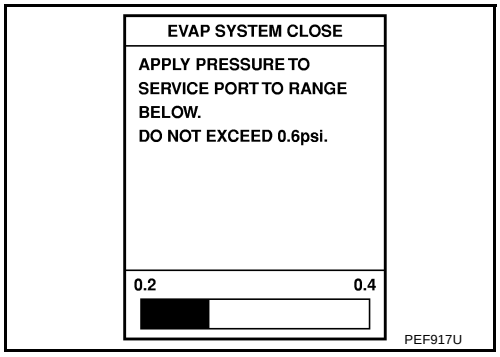
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

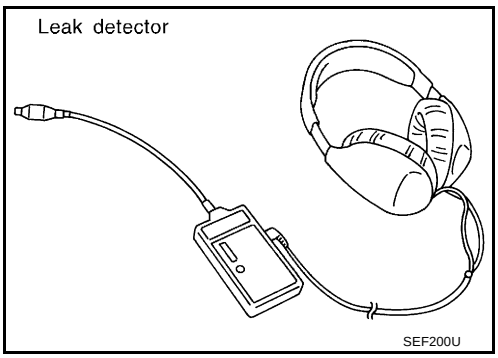
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch “ON”.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.

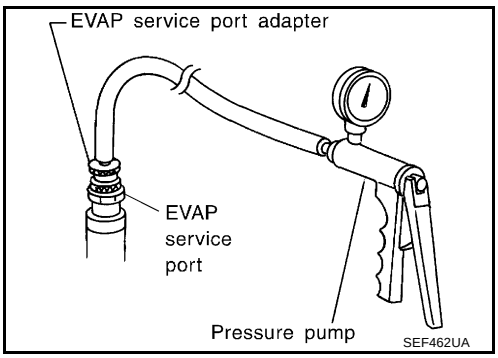


8. Locate the leak using a leak detector. Refer to “EVAPORATIVE EMISSION LINE DRAWING”, EC-607 .

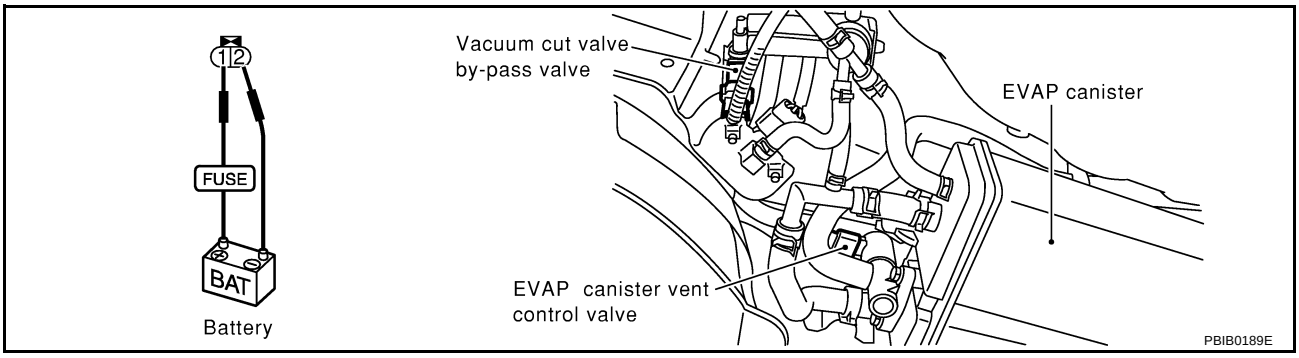


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.



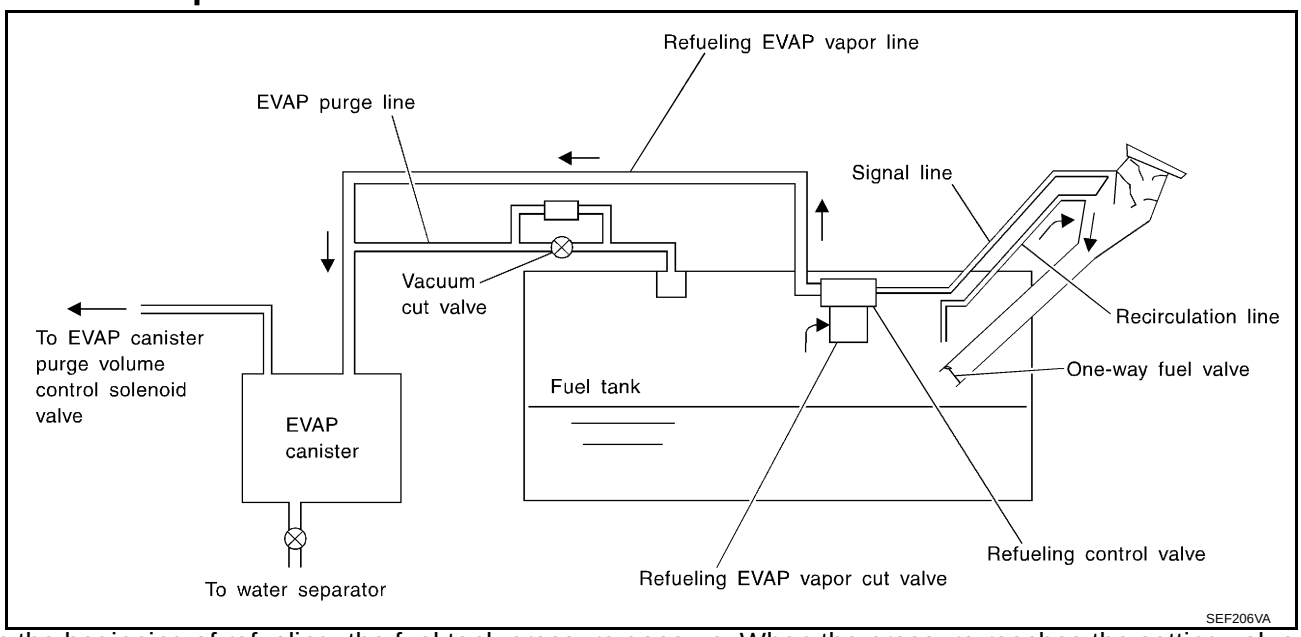
4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to “EVAPORATIVE EMISSION LINE DRAWING”, EC-607 .

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

EBS001EO



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to “Fuel Pressure Release”, EC-48 .**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Diagnostic Procedure

EBS001EP

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

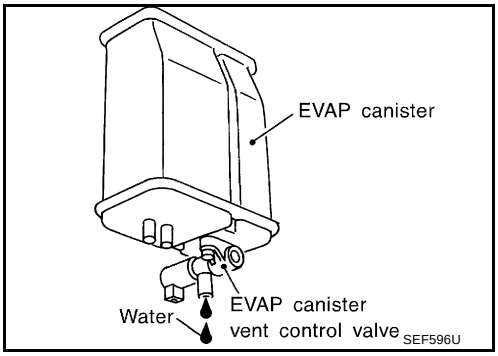
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to “Component Inspection”, EC-616 .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to “Component Inspection”, EC-616 .

OK or NG

OK >> GO TO 7.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING CONTROL VALVE

Refer to “Component Inspection”, EC-617 .

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling control valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

OK or NG

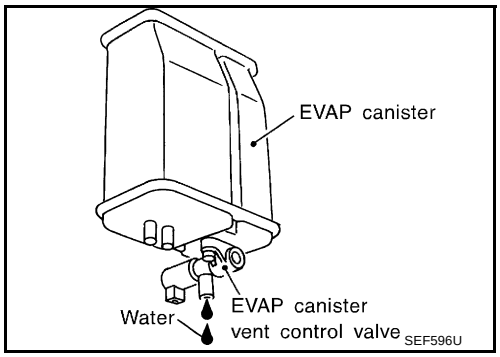
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

Refer to “Component Inspection”, EC-616 .

OK or NG

OK >> GO TO 5.
NG >> Replace water separator.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

Refer to “Component Inspection”, EC-617 .

OK or NG

OK >> GO TO 9.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to “Component Inspection”, EC-616 .

OK or NG

OK >> GO TO 10.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 11.
NG >> Replace fuel filler tube.

11. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

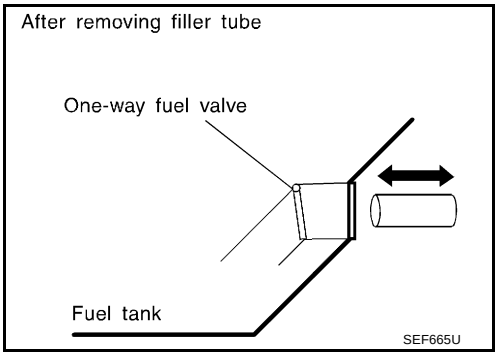
OK >> GO TO 12.
NG >> Repair or replace one-way fuel valve with fuel tank.

12. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.

OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection

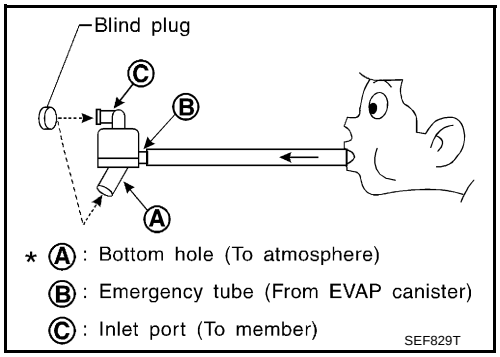
EBS001EQ

WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to FL-6, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.

b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.

c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

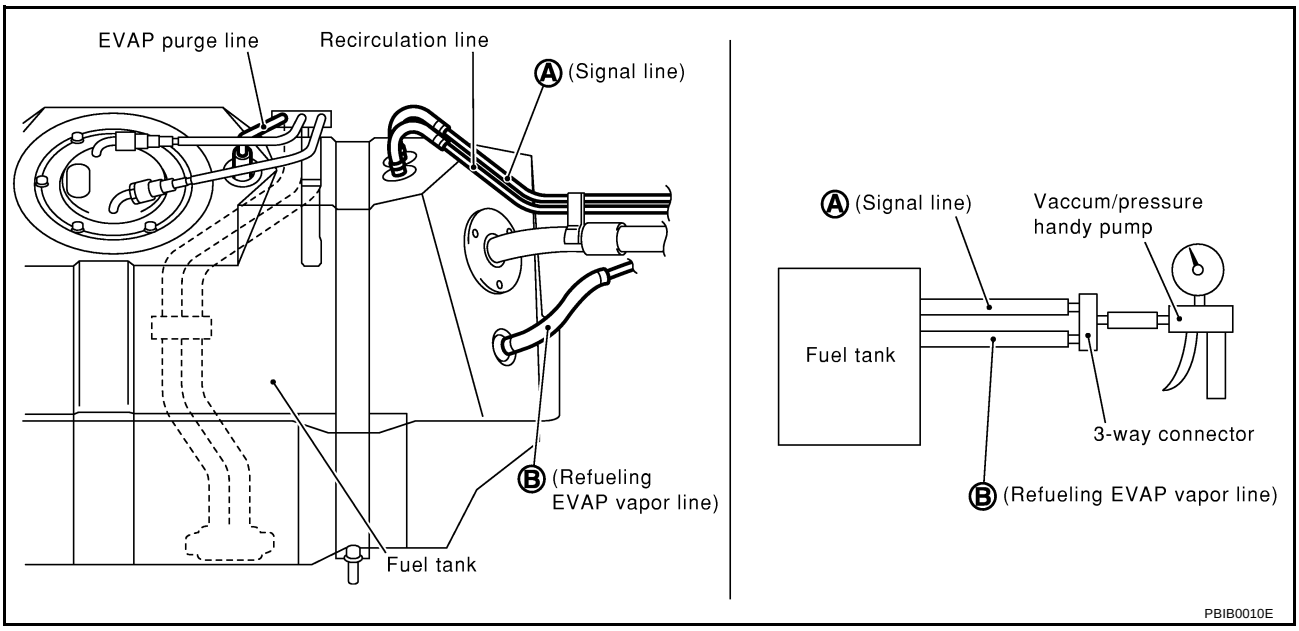
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.

b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.

c. Put fuel tank upside down.

d. Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



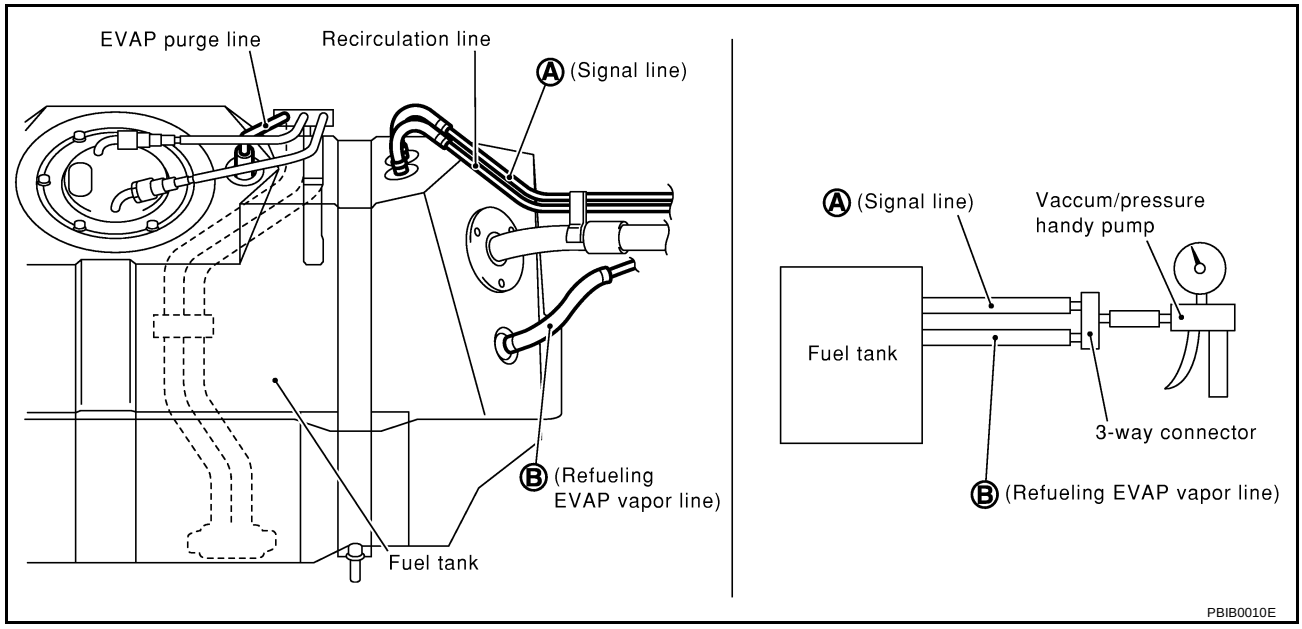
With GST

1. Remove fuel tank. Refer toFL-6, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

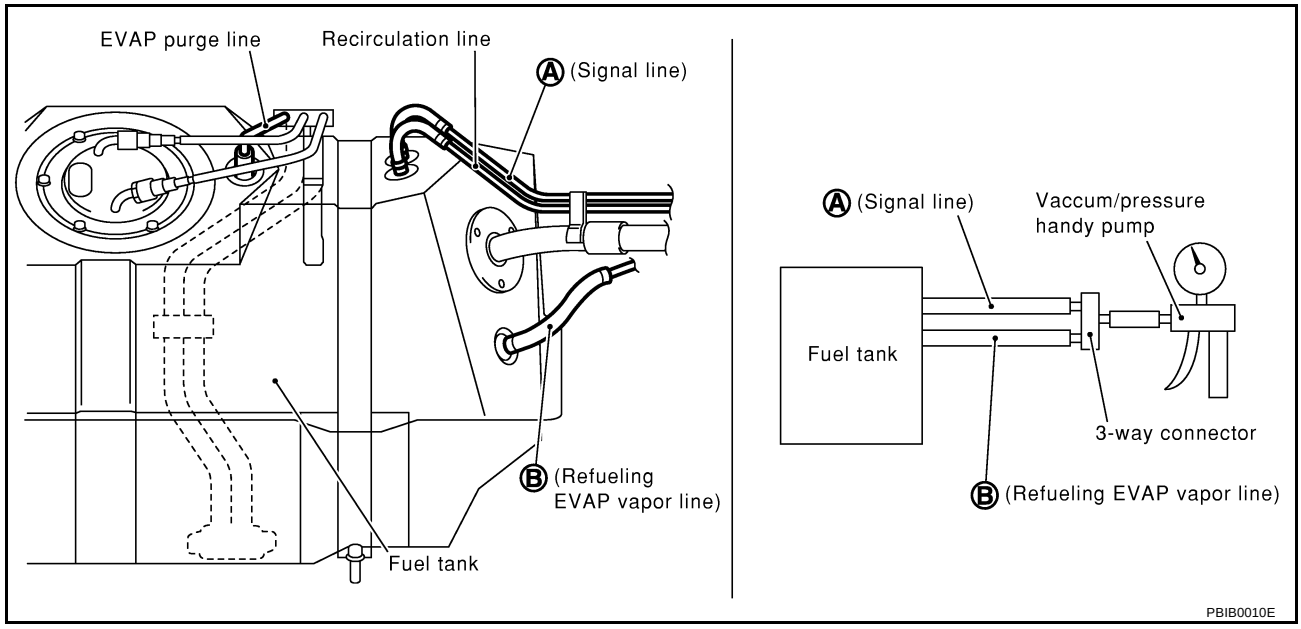
a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.

4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



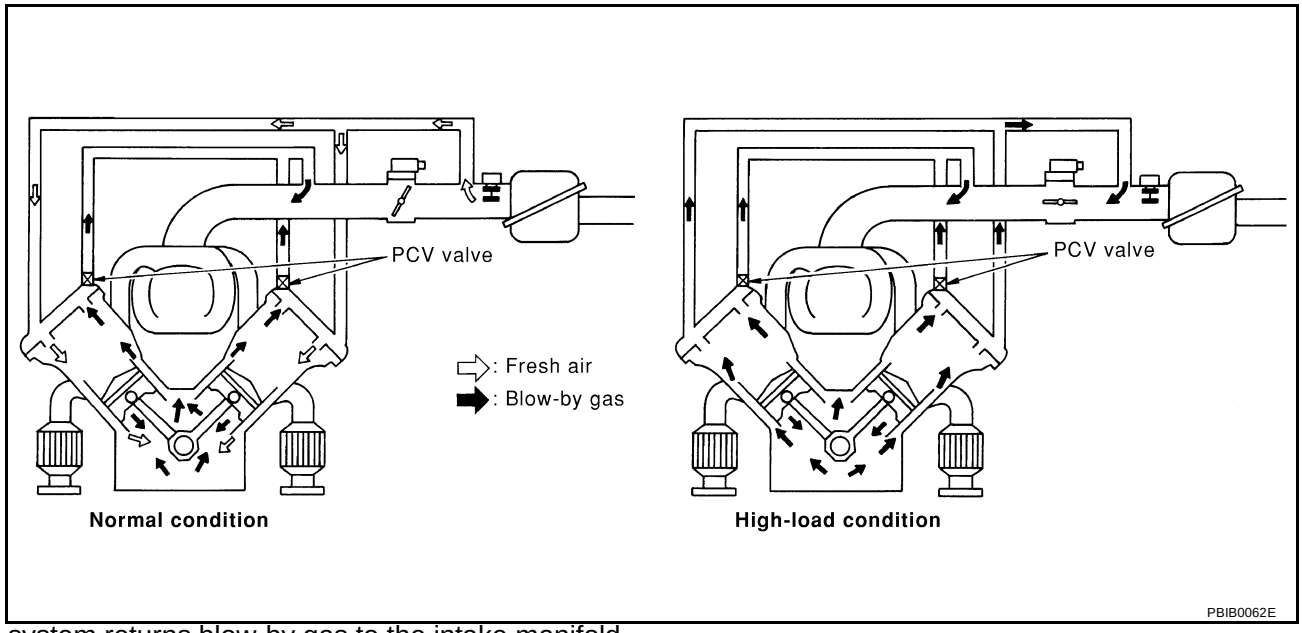
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

EBS001ER

SYSTEM DESCRIPTION



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

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

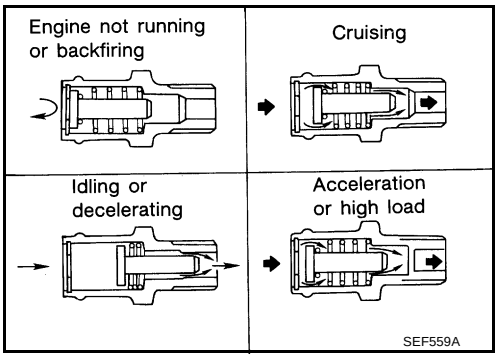
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

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

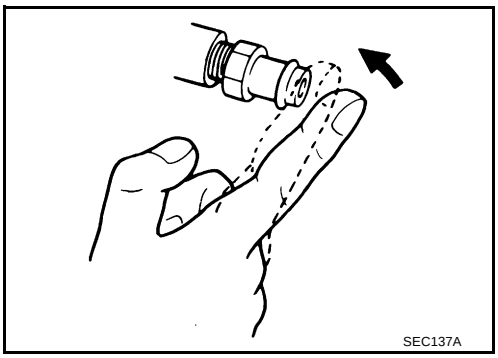


Component Inspection

EBS001ES

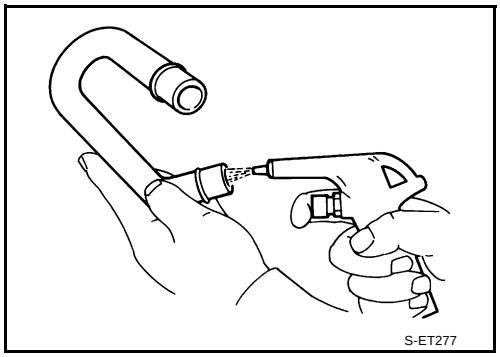
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



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)

PFP:00030

Fuel Pressure Regulator

EBS001ET

Fuel pressure at idling kPa (kg/cm^2 , psi)	
Vacuum hose is connected.	Approximately 235 (2.4, 34)
Vacuum hose is disconnected.	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

EBS001EU

Target idle speed	No-load*1 (in “P” or N” position)	650±50 rpm
Air conditioner: ON	In “P” or N” position	700 rpm or more
Ignition timing	In “P” or N” position	17°±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

EBS001EV

	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

Mass Air Flow Sensor

EBS001EW

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.2 - 1.8*V
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

EBS001EX

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

EBS001EY

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

EBS002LW

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen sensor 2

EBS002LX

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Temperature Sensor

EBS001F2

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Crankshaft Position Sensor (POS)

EBS001F3

Refer to EC-339, "Component Inspection" .

Camshaft Position Sensor (PHASE)

EBS001F4

Refer to EC-344, "Component Inspection" .

Radiator Coolant Temperature Sensor

EBS002LU

Radiator coolant temperature °C (°F)	Resistance kΩ
–10 (14)	9.017 - 9.723
20 (68)	2.437 - 2.595
90 (194)	0.2416 - 0.2575
110 (230)	0.1451 - 0.1522
150 (302)	0.05927 - 0.06267

Throttle Control Motor

EBS002O2

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

EBS001F8

Resistance [at 20°C (68°F)]	14 - 15Ω

Fuel Pump

EBS001F9

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω